In-situ Permeability Testing of Brown Cohesive Soil Liner for Cell 2 of the BP Chemicals Mixed Waste Closure Project

For

BP Chemicals, Inc.
Amanda & Adgate Roads
Lima, Ohio 45804

Report No. 114409-0299-047

February 25, 1999

BOWSER MORNER.

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ENGINEERING REPORT

REPORT TO: BP Chemicals, Inc.
Amanda & Adgate Roads
Lima, Ohio 45804

Attn: Mr. William Rupert

REPORT DATE: February 25, 1999

REPORT NO: 114409-0299-047

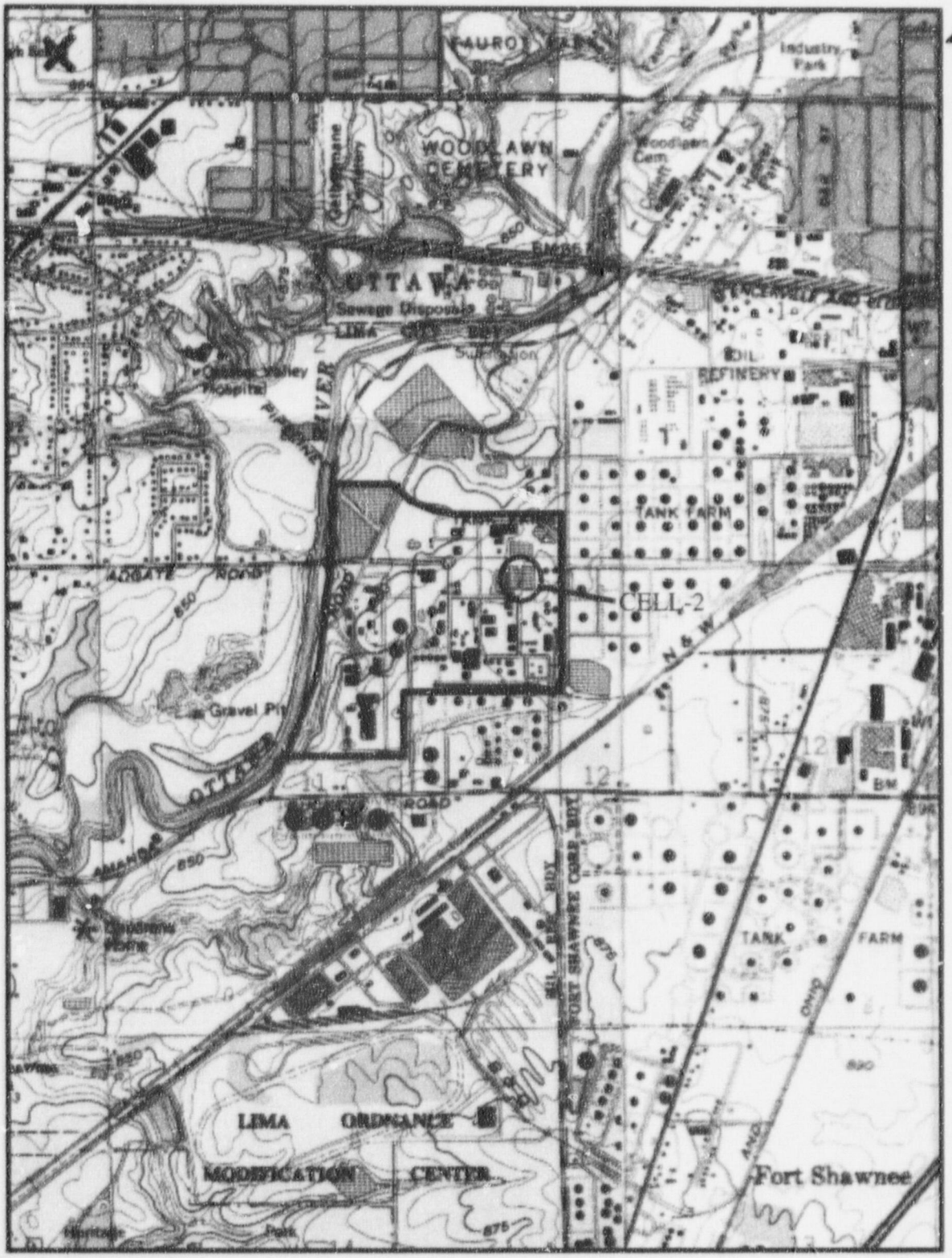
REPORT ON: In-situ Permeability Testing of Brown Cohesive Soil Liner for Cell 2 of the BP Chemicals Mixed Waste Closure Project

Gentleman:

We are pleased to submit this report that presents the results of the field permeability testing of the brown cohesive soil liner in Cell 2 relative to the Mixed Waste Closure Project. The BP Chemicals, Inc. (BPCI) Mixed Waste Pond Closure Project is located in Lima, Ohio as shown on Figure 1, Site Location Map. A discussion of the purpose, work performed and results are in the sections that follow.

1.0 INTRODUCTION

Sevenson Environmental Services, Inc. (SES) removed contaminated soil from the Burn and Deepwell Ponds in 1998. SES then excavated the underlying, "clean" cohesive soils to the designed subgrade for the recompacted soil liner of Cell 2. The excavated "clean" gray and brown cohesive soils were separated and stockpiled. The gray and brown cohesive soils were used for the construction of the structural backfill and recompacted soil liner for Cell 2. The gray cohesive soil was used in the northern half of the bottom liner and the sidewall liner. Brown cohesive soil was placed as the recompacted soil liner in the southern half of Cell 2 as shown in Figure 2. The brown cohesive soil was placed in accordance with the criteria established with the construction of Test Pad No. 2, which was performed in 1994 for the brown cohesive soil at the EOLM borrow site. The physical characteristics of the brown cohesive soils excavated from the Burn and Deepwell ponds versus the EOLM borrow site previously tested and used to construct Cell 1 were essentially equivalent based on the judgement of the project's certification engineer (Dames & Moore). Bowser-Morner conducted field permeability tests to confirm the in-situ permeability of the brown cohesive soil excavated from the Burn and Deepwell ponds. This report describes the installation and test results.



U.S.G.S. QUAD: LIMA AND CRIDERSVILLE, OHIO

SITE LOCATION MAP

BP CHEMICALS, INC.
LIMA, OHIO

11-98/HGW

PROJECT NO.	114409
SCALE	N.T.S.
FIGURE NO.	2

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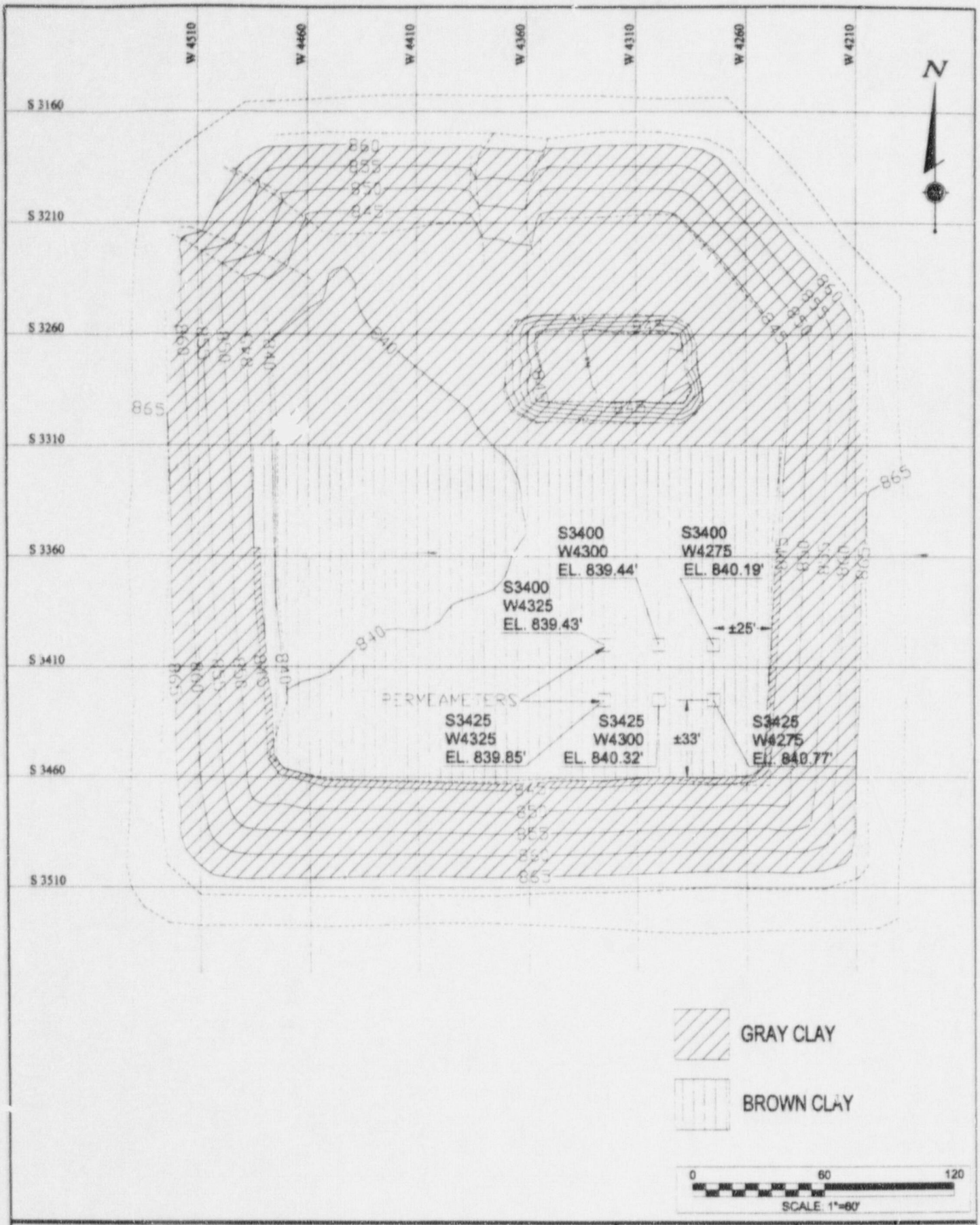

BROWN AND GRAY COHESIVE SOIL LINER IN CELL 2

BP CHEMICALS
MIXED WASTE CLOSURE PROJECT

02-99/SR/HW

PROJECT NO.	114409
SCALE	1=60
FIGURE NO.	2

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1.1 BACKGROUND

The construction of the three foot recompacted soil liner and winterization protection layer in Cell 2 was completed on October 2, 1998. The brown cohesive soil portion of the recompacted liner was constructed in accordance with equipment and procedures established by Test Pad No. 2. The brown cohesive soil was placed and spread with a bulldozer in loose lifts of 8 inches thick. The loose lift thickness was controlled with grade stakes. Each lift was compacted with a minimum 10 passes utilizing a sheepsfoot compactor. The lifts were compacted to 90 percent of the maximum dry unit weight at 0 to +4 percent of the optimum moisture content as determined by the Modified Proctor test. Nuclear density/moisture tests were performed on the compacted lifts to confirm that the required in-place density and moisture content were achieved. Details of the soil placement, compaction, and testing of the clay liner in southern portion of Cell 2 bottom is included in Construction Observation Report No. 114409-1198-328.

1.2 PURPOSE

The purpose of the field permeability test (Two-Stage Borehole Procedure) was to demonstrate that the brown cohesive soil excavated from Cell 2 and placed in the bottom of the southern portion of Cell 2 will exhibit permeability equal to or less than the project permeability specification of 1×10^{-7} cm/sec consistent with Test Pad No. 2.

1.3 SCOPE OF WORK

The scope of work associated with the field permeability testing included the following:

- Test pit excavation through the winterization cover,
- Observation and documentation of the construction activities of the test pad,
- Installation of permeameters, and
- Field permeability testing and monitoring.

2.0 LABORATORY TESTING OF BROWN COHESIVE SOIL

The characteristics of representative samples of brown cohesive soil, used to construct part of the Cell 2 recompacted liner, were determined at a frequency of 1 per

1,000 cubic yards of material by the following test methods as required by Section 02220 of the project specifications.

- Unified Soil Classification System (USCS) Classification (ASTM D-422, D-2216, D-4318, D-2487)
- Modified Proctor (ASTM D-1557 method B)
- Remolded permeability (ASTM D-5084)

The results of the USCS Classifications performed on the representative samples of the brown cohesive soil were in compliance with Section 3.2.4 Backfill of the project specifications that required:

- soil material be described as CL or CH,
- 100 percent of the particle size be less than 2 inches,
- 60 percent of the particles be less than #200 sieve (.075 mm),
- liquid limit be greater than 25 percent, and
- plasticity index ranging from 10 to 40.

A total of 10 Modified Proctor tests were performed on the representative brown cohesive soil samples. The average maximum dry density and optimum moisture content of the samples were 123.4 pcf and 11.7 percent, respectively.

Remolded permeability tests were also performed by recompacting samples to approximately 90 percent of the maximum dry unit weight at about +2 percent of the optimum moisture content as determined by the Modified Proctor test (ASTM D-1557). The permeability results of the 10 samples ranged from 1.8×10^{-8} to 9.6×10^{-8} cm/sec. The permeability test results were in compliance with the specifications and regulatory maximum of 1×10^{-7} cm/sec.

The results of the laboratory testing are summarized in Table 2-1. The laboratory test result are included in Appendix B.

3.0 IN-SITU FIELD PERMEABILITY TEST

Test pits, approximately 5 feet by 5 feet in size, were excavated through the 3-foot thick winterization material placed in the southern portion of Cell 2. The distance

Table 2-1: Summary of Laboratory Testing for the Brown Cohesive Soils from Cell 2 North Side Slope

Sample Location	Sample Depth (ft.)	Material Description	USCS Description	Dry Unit Weight (pcf)	Optimum Moisture (%)	Percent > 2 inches (%)	Percent Gravel (%)	Percent Sand (%)	Percent < #200 sieve (%)	Percent Silt (%)	Percent Clay (%)	Liquid Limit (%)	Plasticity Index (%)	Permeability 90%, +2 cm/sec
		Specification Requirement	**CL or CH**	-	-	**0.0**	-	-	**60**	-	-	**> 25**	**10 to 40**	**1.0×10^{-7}**
Grid B-10+ TNW	859-857	brown lean CLAY with sand	CL	125.2	11.0	0.0	2.5	20.0	77.5	48.3	29.2	32	14	3.2E-08
Grid B-11- MNW	851-849	brown lean CLAY with sand	CL	123.9	12.0	0.0	1.9	19.1	79.0	48.7	30.3	33	15	9.6E-08
Grid C-10+ TNW	858-856	brown lean CLAY with sand	CL	122.6	12.8	0.0	2.9	17.8	79.3	43.6	35.7	30	12	8.9E-08
Grid C-11- MNW	851-849	brown lean CLAY with sand	CL	117.8	13.3	0.0	0.4	15.5	84.1	43.2	40.9	45	25	2.5E-08
Grid D-10+ TNW	858-856	brown lean CLAY with sand	CL	123.4	11.5	0.0	2.5	18.9	78.6	46.5	32.1	30	13	1.8E-08
Grid D-11- MNW	852-849	brown lean CLAY with sand	CL	123.2	12.0	0.0	1.5	19.2	79.3	45.8	33.5	34	16	4.7E-08
Grid G-10+ TNW	855-853	brown lean CLAY with sand	CL	124.8	10.9	0.0	2.9	18.5	78.6	46.2	32.4	29	12	2.6E-08
Grid G-11- MNW	851-849	brown lean CLAY with sand	CL	123.4	11.7	0.0	3.4	18.0	78.6	46.1	32.5	32	14	3.6E-08
Grid H-10+ TNW	854-852	brown lean CLAY with sand	CL	124.9	10.8	0.0	2.7	19.4	77.9	45.9	32.0	30	13	3.4E-08
Grid H-11- MNW	851-849	brown lean CLAY with sand	CL	124.8	11.3	0.0	1.9	17.9	80.2	45.2	35.0	31	14	2.5E-08
AVERAGE				**123.4**	**11.7**	**0.0**	**2.3**	**18.4**	**79.3**	**46.0**	**33.4**	**33**	**15**	**4.3E-08**

Percent Gravel = Percent retained on #4 sieve
Percent Sand = Percent passing #4 sieve and retained on #200 sieve
Percent Silt = Percent passing #200 sieve and larger than 0.002 mm
Percent Clay = Percent finer than 0.002 mm

between the center of each pit was approximately 25 feet and the pits were located at a distance of approximately 25 feet from the toe of the side slopes of the cell as shown in Figure 2. The permeameters were installed in the existing recompacted brown cohesive soil liner exposed by the excavations. Construction photographs are included in Appendix C.

3.1 PERMEAMETER INSTALLATION AND TESTING

The in-place permeability of the constructed brown cohesive soil liner was measured by performing the Two-Stage Borehole procedure known as the "Boutwell Procedure," which involved installing five permeameters and one temperature effect gauge, as shown in Figure 2. Each of the permeameters consisted of a borehole that was manually augured and advanced to a predetermined depth (approximately 10 inches below the top of the three-foot liner). A 4-inch diameter PVC casing was installed in the borehole, and the annulus between the wall of the borehole and wall of the casing was sealed with bentonite. The borehole bottom was flush with the bottom of the casing. A top assembly cap was attached to the casing and a standpipe was connected to the top assembly cap. The standpipe and the casing were filled with water. Reading of the water level, temperature, and the time were recorded until steady state flow rate was achieved. Tents of approximate dimension of 10 feet by 10 feet were placed over the six pits to divert the surface water run-off from the pit excavation. The data for the field test is included in Appendix A.

The Stage I average limiting vertical hydraulic conductivity (K_1) relative to the in-situ brown soil liner was 1.0×10^{-7} cm/sec. The maximum permeability observed from the five permeameters was 1.3×10^{-7} cm/sec. Stage I data indicates that the maximum vertical permeability cannot be greater than 1×10^{-7} cm/sec, which is in compliance with OAC 3745-27-08(C)(1)(a).

Stage II boreholes could not be advanced properly due the hardness exhibited by the soil. An unusual amount of force was required to advance the boreholes to an acceptable depth, which resulted in soil disturbance such as cracking and tearing. The effect of this disturbance along the sidewalls of the Stage I portion of the test was minimized by sealing the annular space between the permeameter and borehole with bentonite clay. However, the seals were compromised during the extension of the boreholes for Stage II.

The average horizontal hydraulic conductivity calculated from the results of Stage II is 4×10^{-6} cm/sec, which yields a vertical permeability of 5×10^{-9} cm/sec. The results of Stage II indicate either poor bonding between soil lifts or leakage at the seals of the permeameters. The construction of the brown cohesive soil liner was observed and documented to be in strict compliance with the project specifications and placement procedures established with Test Pad No. 2 relative to the brown cohesive soil from the approved EOLM borrow area. Individual lifts could not be distinguished from visual observations of 10 relatively undisturbed samples (shelby tubes) of the brown cohesive soil excavated from Cell 2. Therefore, it is our professional opinion that the horizontal permeability determined from Stage II is erroneously high due to the probability of the seals leaking.

3.4 CONCLUSIONS

The results of the Two-Stage Borehole Test demonstrate compliance with OAC 3745-27-08(C)(1)(a) relative to each lift having a maximum permeability of 1×10^{-7} cm/sec.

If you have any questions please contact me.

Respectfully submitted,

BOWSER-MORNER ASSOCIATES, INC.

Robert J. Fletcher for

Ravi Wani
Civil/Environmental Engineer

Patrick J. Loper

Patrick J. Loper II., P.E.
Project Manager

RW/PJL/krd
3-Addressee
1-Attn: Mr. Rich Hajer
Dames & Moore
1-Attn: Mr. Robert Blickwedehl
Dames & Moore
2-File

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APPENDIX A

TWO STAGE BOREHOLE
FIELD PERMEABILITY TEST REPORT

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4518 Taylorsville Road
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937-233-2016 FAX

February 24, 1999

BP Chemicals, Inc.
Attn: Mr. William M. Rupert
Ft. Amanda & Adgate Roads
P.O. Box 628
Lima, OH 45804

Re: Field Measurement of Hydraulic Conductivity (Permeability) Limits Using the Two-Stage Borehole Procedure – In Situ Liner

Dear Mr. Rupert:

This report presents results of a field test performed to determine the in situ hydraulic conductivity (permeability) of the brown clay soil liner portion of cell 2 located at BP Chemicals, Lima, Ohio. Testing was initiated on October 14, 1998 and completed on November 6, 1998.

Testing was performed using the two-stage borehole procedure, also referred to as the "Boutwell Procedure", so named due to the development by Dr. Gordon P. Boutwell of Soil Testing Engineers, Baton Rouge, Louisiana. The procedure involved installing five permeameters plus one temperature effect gauge (TEG) in shallow borings (approximately 25 cm deep) across the clay soil liner. Pits were excavated through the 36-inch thick winter protection layer to the top elevation of the liner surface prior to installation of the permeameters. Falling head permeability tests were performed at each of two stages, i.e., flush with the bottom of the borehole and then with the borehole extended. A schematic diagram of the equipment installation is presented in Fig. 1. Time, flow, and temperature readings were recorded until a quasi-steady flow rate was achieved.

Results were calculated using the appropriate Hvorslev equations as follows:

Stage I = $K_1 = R_t G_1 \ln (H_1/H_2') / \Delta t$

Stage II = $K_2 = R_t G_2 \ln (H_1/H_2') / \Delta t$

Explanation of equation variables is contained on the following pages.

The direct results of the test are the limiting values for vertical and horizontal hydraulic conductivities, K_1 and K_2, respectively. These values assume isotropic soil conditions and are the maximum possible for the vertical direction, and minimum possible for the horizontal direction.

Difficulties in advancing the boreholes were experienced during drilling the Stage I borehole due to the density exhibited by the soil. An unusual amount of force was required to advance the hole to an acceptable depth. Care was taken to minimize disturbance around the area of the

installation, but some soil disturbance, i.e., cracking and tearing was noted. We believe the effect of this disturbance along the sidewalls of the Stage I portion of the test was minimized by sealing the annular space between the permeameter and borehole with bentonite clay. Data was collected for evaluation from the Stage II portion of the test even though it was suspected the seals were compromised during the extension of the boreholes. We believe the values calculated for K_v and K_h based upon K_2 data are not consistent nor reasonable based upon previously established laboratory results. The Stage I data does indicate that the vertical hydraulic conductivity, K_v, cannot be greater than 1×10^{-7} c/s.

Final results of this procedure performed at the subject site are summarized below:

Summary of Field Hydraulic Conductivity Results

Unit No.	Limiting Vertical Hydraulic Conductivity, cm/sec. (k_1)	Limiting Horizontal Hydraulic Conductivity, cm/sec. (k_2)	Vertical Hydraulic Conductivity, cm/sec. (k_v)	Horizontal Hydraulic Conductivity cm/sec. ($\bar{k}_h$)
006	8.35×10^{-8}	1.73×10^{-6}	9.67×10^{-10}	7.21×10^{-6}
007	1.31×10^{-7}	5.04×10^{-7}	1.30×10^{-8}	1.32×10^{-6}
008	1.04×10^{-7}	1.09×10^{-6}	2.78×10^{-9}	3.89×10^{-6}
009	7.92×10^{-8}	5.36×10^{-7}	3.68×10^{-9}	1.70×10^{-6}
010	1.13×10^{-7}	1.11×10^{-6}	3.27×10^{-9}	3.90×10^{-6}
Ave.	1.02×10^{-7}	9.94×10^{-7}	4.73×10^{-9}	3.60×10^{-6}

The following items are presented on the succeeding data sheets:

- Stage I Data Summary
- Stage II Data Summary
- Calculations of K_v and K_h
- Daily Field Readings

Should you have any questions, or if we may be of further service, please contact us at (937) 236-8805.

Respectfully submitted,

BOWSER-MORNER, INC.

James W. Fletcher, Vice President
Manager of Laboratory Services
Construction Services Division

JWF/jwf
005246
1-Client
1-File

REFERENCES

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Daniel, D.E. (1989), and L.I. Greenfield (1988), "Design, Construction, and Evaluation of Clay Liners for Waste Management Facilities", EPA/530/SW - 86/007F, U.S. EPA, November, 1988, pp. 3-57 through 3-61.

Hvorslev, M.J. (1949), "Time Lag in the Obervation of Ground Water Levels and Pressures", U.S. Army Engineers Experiment Station, Vicksburg, Miss.

Sai, J.O., and D.C. Anderson (1990), "Field Hydraulic Conductivity Tests for Compacted Soil Liners", ASTM Geotechnical Testing Journal, Vol. 13, No. 3, September, 1990, pp. 215-225.

Soil Testing Engineers, Inc. (1983), "STEI Two-Stage Permeability Test", Soil Testing Engineers, Inc., Baton Rouge, Louisiana.

STAGE I DATA SUMMARY

Unit No.	d	D_1	a	b_1	$G_1(x10^{-2})$	K_1(ave)
006	1.27	11.43	0	91.44	4.030	8.30×10^{-8}
007	1.27	11.43	0	91.44	4.030	1.31×10^{-7}
006	1.27	11.43	0	91.44	4.030	1.04×10^{-7}
008	1.27	11.43	0	91.44	4.030	7.92×10^{-8}
009	1.27	11.43	0	91.44	4.030	1.13×10^{-7}
Ave.						1.02×10^{-7}

Where:

d = inside diameter (ID) of standpipe, cm

D_1 = effective diameter of casing, cm

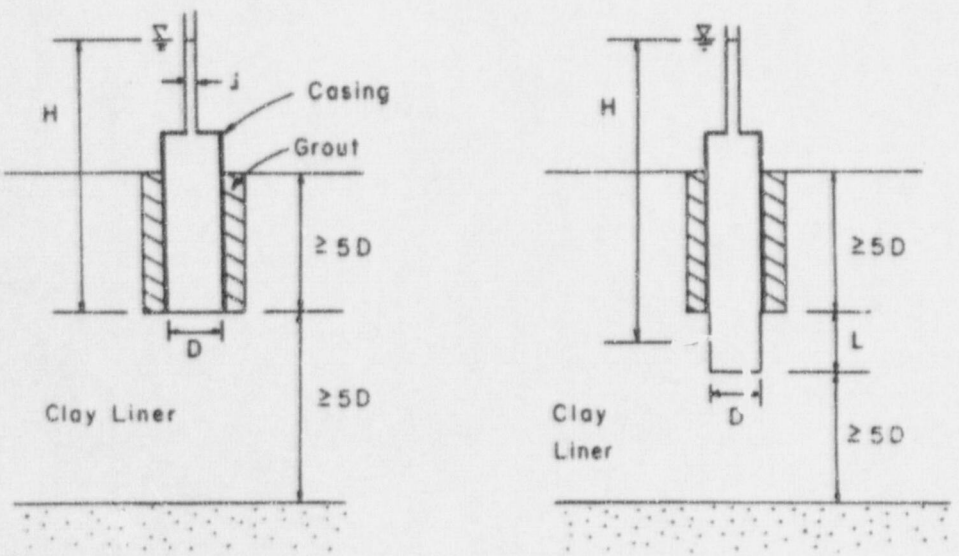
a = constant for permeable base at b_1

b_1 = thickness of tested layer between bottom of casing & top of underlying stratum, cm

G_1 = calculation constant obtained from equipment geometry

$$G_1 = (\pi d^2/11\ D_1)[1 + a(D_1/4b_1)]$$

K_1 = limiting vertical hydraulic conductivity = $R_1\ G_1\ \ln (H_1/H_2')/\ \Delta t$, cm/sec.



STAGE I STAGE II

Fig. 1 Schematic Diagram of Two-Stage Insitu Hydraulic Conductivity Test

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STAGE II DATA SUMMARY

For all units: D_1 = 10.16 cm
d = 1.27 cm
a = 0
b_2 = 81.91 cm

Unit.	L	L/D	F	G_4	G_3	G_2 (x 10^{-2})	K_2 (ave)
006	19.05	1.875	0.9702	4.00	2.773	1.5122	1.73×10^{-6}
007	19.05	1.875	0.9702	4.00	2.773	1.5122	5.04×10^{-7}
008	19.05	1.875	0.9702	4.00	2.773	1.5122	1.09×10^{-6}
009	19.05	1.875	0.9702	4.00	2.773	1.5122	5.36×10^{-7}
010	19.05	1.875	0.9702	4.00	2.773	1.5122	1.11×10^{-6}
Ave.							9.94×10^{-7}

Where:

L = Length of stage 2 extension below bottom of casing, cm

L/D = Length: Diameter Ratio

b_2 = distance from center of stage 2 extension to top of underlying stratum, cm

$G_2 = (d^2/16FL)G_3$

$G_3 = 2\,\mathrm{Ln}(G_4) + a\,\mathrm{Ln}(G_5)$

$G_4 = L/D + [1 + (L/D)^2]^{1/2}$

$$G_5 = \frac{[4b_2/D + L/D] + [1 + (4b_2/D + L/D)^2]^{1/2}}{[4b_2/D - L/D] + [1 + (4b_2/D - L/D)^2]^{1/2}}$$

$F = 1 - 0.5623\ \mathrm{Exp}(-1.566\ L/D)$

K_2 = limiting horizontal hydraulic conductivity = $R_t\, G_2\, \mathrm{Ln}(H_1/H_2')\ /\ \Delta t$, cm/sec.

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Calculations for K_v and K_h

$$K_2/K_1 = \frac{\ln [\, L/D + \sqrt{1+(L/D)^2}\,]}{\ln [\, m\,(L/D) + \sqrt{1 + m\,(L/D)^2}\,]} * m \; ; \quad \text{where } L/D = 1.875$$

$$K_v = 1/m\, K_1$$

$$K_h = m\, K_1$$

In-place Liner (brown clay)

Stage I (K_1)

Elapsed Time, Hrs	Infiltrometer No.				
	006	007	008	009	010
1	1.16E-07	2.88E-07	5.49E-07	3.74E-07	5.81E-07
2	1.05E-07	2.93E-07	5.70E-07	3.84E-07	6.18E-07
3	1.05E-07	2.60E-07	4.97E-07	3.39E-07	5.06E-07
4	1.17E-07	2.89E-07	5.27E-07	3.87E-07	6.24E-07
24	1.29E-07	2.95E-07	5.80E-07	2.53E-07	5.09E-07
48	**7.51E-08**	**1.37E-07**	3.77E-07	5.85E-08	**8.17E-08**
120	**7.22E-08**	**1.18E-07**	2.76E-07	6.66E-08	**1.00E-07**
144	**8.30E-08**	**1.26E-07**	**1.18E-07**	**7.94E-08**	**1.14E-07**
168	**8.95E-08**	**1.10E-07**	**9.41E-08**	**8.16E-08**	**1.04E-07**
192	**8.67E-08**	**1.27E-07**	**9.88E-08**	**7.75E-08**	**1.13E-07**
216	**8.38E-08**	**1.47E-07**	**1.11E-07**	**7.61E-08**	**1.35E-07**
288	**9.47E-08**	**1.55E-07**	**9.76E-08**	**8.16E-08**	**1.46E-07**
Ave	**8.35E-08**	**1.31E-07**	**1.04E-07**	**7.92E-08**	**1.13E-07**
Ave. 1.02E-07					

Stage II (K_2)

Elapsed Time, Hrs	Infiltrometer No.				
	006	007	008	009	010
1	**1.87E-06**	**5.23E-07**	**1.03E-06**	**5.23E-07**	**1.18E-06**
2	**1.80E-06**	**5.20E-07**	**1.04E-06**	**5.51E-07**	**1.14E-06**
3	**1.87E-06**	**5.39E-07**	**1.18E-06**	**5.20E-07**	**1.27E-06**
4	**1.73E-06**	**4.89E-07**	**9.87E-07**	**5.85E-07**	**1.06E-06**
5	**1.70E-06**	**4.98E-07**	**1.10E-07**	**5.59E-07**	**1.14E-06**
24	**1.67E-06**	**4.75E-07**	**1.20E-06**	**5.09E-07**	**1.09E-06**
48	**1.73E-06**	**5.19E-07**	**1.12E-06**	**5.50E-07**	**1.07E-06**
72	**1.69E-06**	**5.09E-07**	**1.13E-06**	**5.16E-07**	**1.04E-06**
96	**1.54E-06**	**4.66E-07**	**1.07E-06**	**5.10E-07**	**9.89E-07**
Ave	**1.73E-06**	**5.04E-07**	**1.09E-06**	**5.36E-07**	**1.11E-06**
Ave. 9.94E-07					

K_2/K_1	20.7	3.85	10.48	6.77	9.82
M	86.3	10.1	37.4	21.5	34.5
K_v	9.67E-10	1.30E-08	2.78E-09	3.68E-09	3.27E-09
Ave. K_v 4.73E-09					
K_h	7.21E-06	1.32E-06	3.89E-06	1.70E-06	3.90E-06
Ave. K_h 3.60E-06					

Bold values are averaged as quasi-steady state flow

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BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I TEMPERATURE EFFECT GUAGE

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Temp Correct	k' cm/sec
10/14/98	12:00	13.1			54.5							
	13:00	13.5	3600		54.5		0.0				1.164	
	14:00	13.8	3600		54.4		0.1				1.157	
	15:00	14.1	3600		54.4		0.0				1.149	
	16:00	14.4	3600		54.4		0.0				1.142	
	16:15	14.4	900		54.4		0.0				1.142	
10/15/98	8:30	12.5	58500		54.7		-0.3				1.188	
	8:35	12.5	300		54.7		0.0				1.188	
	9:30	12.5	3300		54.5		0.2				1.188	
	10:30	12.8	3600		54.5		0.0				1.181	
	11:30	13.1	3600		54.3		0.2				1.174	
	12:30	13.5	3600		54.2		0.1				1.164	
	13:30	13.9	3600		54.2		0.0				1.154	
10/16/98	8:00	14.4	66600		54.4		-0.2				1.142	
	9:00	14.3	3600		54.3		0.1				1.144	
	10:00	14.5	3600		54.2		0.1				1.139	
	11:00	14.7	3600		54.0		0.2				1.134	
	12:00	15.0	3600		54.0		0.0				1.127	
	13:00	15.1	3600		54.0		0.0				1.125	
	14:00	15.2	3600		54.0		0.0				1.122	
	15:00	15.3	3600		54.0		0.0				1.120	
	15:00	15.3	0		54.0		0.0				1.120	
10/19/98	8:10	12.8	234600		54.4		-0.4				1.181	
	8:10	12.7	0		54.4		0.0				1.183	
	9:10	12.6	3600		54.4		0.0				1.186	
	10:10	12.7	3600		54.3		0.1				1.183	
	11:10	12.9	3600		54.2		0.1				1.179	
	12:10	13.3	3600		54.0		0.2				1.169	
	13:10	13.4	3600		53.9		0.1				1.166	
	14:10	14.1	3600		53.9		0.0				1.149	
	15:10	14.2	3600		53.8		0.1				1.147	
10/20/98	8:10	12.4	61200		54.4		-0.6				1.191	
	9:10	12.3	3600		54.4		0.0				1.193	
	10:10	12.2	3600		54.3		0.1				1.196	
	11:10	12.5	3600		54.0		0.3				1.188	
	12:10	12.8	3600		54.0		0.0				1.181	
	13:10	13.2	3600		54.0		0.0				1.171	
	14:10	13.5	3600		53.9		0.1				1.164	
	15:10	13.8	3600		53.9		0.0				1.157	
	16:10	13.8	3600		53.9		0.0				1.157	
10/21/98	8:10	11.5	57600		54.5		-0.6				1.213	
	8:10	11.5	0		54.5		0.0				1.213	
	9:10	11.4	3600		54.5		0.0				1.215	
	10:10	11.5	3600		54.4		0.1				1.213	

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I TEMPERATURE EFFECT GUAGE

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Temp Correct	k' cm/sec
	11:10	11.7	3600		54.2		0.2				1.208	
	12:10	12.1	3600		54.1		0.1				1.198	
	13:10	12.4	3600		54.0		0.1				1.191	
	14:10	12.8	3600		54.0		0.0				1.181	
	15:10	12.9	3600		54.2		-0.2				1.179	
	16:10	12.9	3600		54.3		-0.1				1.179	
10/22/98	8:10	9.0	57600		55.3		-1.0				1.274	
	8:10	9.0	0		55.3		0.0				1.274	
	9:10	8.9	3600		55.3		0.0				1.277	
	10:10	8.6	3600		55.3		0.0				1.284	
	11:10	8.6	3600		55.2		0.1				1.284	
	12:10	8.8	3600		55.0		0.2				1.279	
	13:10	9.5	3600		54.9		0.1				1.262	
	14:10	9.9	3600		54.7		0.2				1.252	
	15:10	10.3	3600		54.5		0.2				1.242	
	16:10	10.4	3600		54.5		0.0				1.240	
10/23/98	8:10	8.7	57600		55.3		-0.8				1.282	
	9:10	8.6	3600		55.4		-0.1				1.284	
	10:10	8.5	3600		55.2		0.2				1.287	
	11:10	9.0	3600		55.0		0.2				1.274	
	12:10	9.4	3600		54.7		0.3				1.264	
	13:10	9.8	3600		54.6		0.1				1.255	
	14:10	10.2	3600		54.4		0.2				1.245	
	15:10	10.5	3600		54.3		0.1				1.237	
	16:10	10.6	3600		54.3		0.0				1.235	
	16:10	10.6	0		54.3		0.0				1.235	
10/26/98	8:00	11.1	229800		54.4		-0.1				1.223	
	9:00	11.2	3600		54.3		0.1				1.220	
	10:00	11.4	3600		54.1		0.2				1.215	
	11:00	11.7	3600		54.0		0.1				1.208	
	12:00	12.0	3600		53.8		0.2				1.201	
	13:00	12.2	3600		53.8		0.0				1.196	
	14:00	12.4	3600		53.8		0.0				1.191	

BOUTWELL FIELD PERMEABILITY
114409 BF CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 006

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
10/14/98	12:00	13.1			59.3			59.3		112.6				
	13:00	13.5	3600		58.3	Y		58.3	112.6	111.6	9.99E-08	1.164		1.16E-07
	14:00	13.8	3600		57.3	Y		57.4	111.6	110.7	9.06E-08	1.157		1.05E-07
	15:00	14.1	3600		56.4	Y		56.4	110.6	109.7	9.15E-08	1.149		1.05E-07
	16:00	14.4	3600		55.4	Y		55.4	109.7	108.7	1.03E-07	1.142		1.17E-07
	16:15	14.4	900		60.0	N		60.0	108.7	113.3		1.142		
10/15/98	8:30	12.5	58500		43.8	Y		43.5	113.3	96.8	1.08E-07	1.188		1.29E-07
	8:35	12.5	300		43.8	N		43.8	97.1	97.1		1.188		
	9:30	12.5	3300		42.9	Y		43.1	97.1	96.4	8.84E-08	1.188		1.05E-07
	10:30	12.8	3600		42.0	Y		42.0	96.2	95.3	1.05E-07	1.181		1.24E-07
	11:30	13.1	3600		41.0	Y		41.2	95.3	94.5	9.44E-08	1.174		1.11E-07
	12:30	13.5	3600		40.0	Y		40.1	94.3	93.4	1.07E-07	1.164		1.25E-07
	13:30	13.9	3600		38.7	Y		38.7	93.3	92.0	1.57E-07	1.154		1.81E-07
10/16/98	8:00	14.4	66600		60.0	N		59.8	92.0	113.1		1.142		
	9:00	14.3	3600		59.2	Y		59.3	113.3	112.6	6.94E-08	1.144		7.94E-08
	10:00	14.5	3600		58.3	Y		58.4	112.5	111.7	7.99E-08	1.139		9.10E-08
	11:00	14.7	3600		57.4	Y		57.6	111.6	110.9	7.04E-08	1.134		7.99E-08
	12:00	15.0	3600		56.9	Y		56.9	110.7	110.2	5.07E-08	1.127		5.71E-08
	13:00	15.1	3600		56.2	Y		56.2	110.2	109.5	7.13E-08	1.125		8.02E-08
	14:00	15.2	3600		55.6	Y		55.6	109.5	108.9	6.15E-08	1.122		6.90E-08
	15:00	15.3	3600		55.0	Y		55.0	108.9	108.3	6.18E-08	1.120		6.93E-08
	15:00	15.3	0		60.0	N		60.0	108.3	113.3		1.120		
10/19/98	8:10	12.8	234600		22.5	Y		22.1	113.3	75.4	7.00E-0[illegible]	1.181		8.26E-08
	8:10	12.7	0		60.0	N		60.0	75.8	113.3		1.183		
	9:10	12.6	3600		59.6	Y		59.6	113.3	112.9	3.96E-08	1.186		4.70E-08
	10:10	12.7	3600		58.9	Y		59.0	112.9	112.3	5.97E-08	1.183		7.06E-08
	11:10	12.9	3600		58.0	Y		58.1	112.2	111.4	8.01E-08	1.179		9.44E-08
	12:10	13.3	3600		57.3	Y		57.5	111.3	110.8	5.04E-08	1.169		5.89E-08
	13:10	13.4	3600		56.5	Y		56.6	110.6	109.9	7.11E-08	1.166		8.29E-08
	14:10	14.1	3600		55.9	Y		55.9	109.8	109.2	6.13E-08	1.149		7.05E-08
	15:10	14.2	3600		55.2	Y		55.3	109.2	108.6	6.17E-08	1.147		7.07E-08
10/20/98	8:10	12.4	61200		44.7	Y		44.1	108.5	97.4	7.11E-08	1.191		8.46E-08
	9:10	12.3	3600		44.1	Y		44.1	98.0	97.4	6.87E-08	1.193		8.20E-08
	10:10	12.2	3600		43.4	Y		43.5	97.4	96.8	6.92E-08	1.196		8.27E-08
	11:10	12.5	3600		42.5	Y		42.8	96.7	96.1	6.97E-08	1.188		8.28E-08
	12:10	12.8	3600		41.9	Y		41.9	95.8	95.2	7.03E-08	1.181		8.31E-08
	13:10	13.2	3600		41.3	Y		41.3	95.2	94.6	7.08E-08	1.171		8.29E-08
	14:10	13.5	3600		40.7	Y		40.8	94.6	94.1	5.93E-08	1.164		6.90E-08
	15:10	13.8	3600		40.0	Y		40.0	94.0	93.3	8.37E-08	1.157		9.68E-08
	16:10	13.8	3600		39.4	Y		39.4	93.3	92.7	7.22E-08	1.157		8.35E-08
10/21/98	8:10	11.5	57600		30.2	Y		29.6	92.7	82.9	7.82E-08	1.213		9.48E-08
	8:10	11.5	0		30.2	N		30.2	83.5	83.5		1.213		
	9:10	11.4	3600		29.5	Y		29.5	83.5	82.8	9.42E-08	1.215		1.15E-07

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 006

g1 value= 4.0300E-02

Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	10:10	11.5	3600		28.9	Y		29.0	82.8	82.3	6.78E-08	1.213		8.22E-08
	11:10	11.7	3600		28.1	Y		28.3	82.2	81.6	8.20E-08	1.208		9.91E-08
	12:10	12.1	3600		27.5	Y		27.6	81.4	80.9	6.90E-08	1.198		8.26E-08
	13:10	12.4	3600		26.9	Y		27.0	80.8	80.3	6.95E-08	1.191		8.27E-08
	14:10	12.8	3600		26.2	Y		26.2	80.2	79.5	9.81E-08	1.181		1.16E-07
	15:10	12.9	3600		26.0	Y		25.8	79.5	79.1	5.65E-08	1.179		6.66E-08
	16:10	12.9	3600		25.7	Y		25.6	79.3	78.9	5.66E-08	1.179		6.67E-08
10/22/98	8:10	9.0	57600		16.3	Y		15.3	79.0	68.6	9.88E-08	1.274		1.26E-07
	8:10	9.0	0		60.0	N		60.0	69.6	113.3		1.274		
	9:10	8.9	3600		59.4	Y		59.4	113.3	112.7	5.94E-08	1.277		7.59E-08
	10:10	8.6	3600		58.7	Y		58.7	112.7	112.0	6.97E-08	1.284		8.96E-08
	11:10	8.6	3600		57.9	Y		58.0	112.0	111.3	7.02E-08	1.284		9.01E-08
	12:10	8.8	3600		57.1	Y		57.3	111.2	110.6	6.06E-08	1.279		7.75E-08
	13:10	9.5	3600		56.2	Y		56.3	110.4	109.6	8.14E-08	1.262		1.03E-07
	14:10	9.9	3600		55.5	Y		55.7	109.5	109.0	5.12E-08	1.252		6.42E-08
	15:10	10.3	3600		54.8	Y		55.0	108.8	108.3	5.16E-08	1.242		6.41E-08
	16:10	10.4	3600		54.1	Y		54.1	108.1	107.4	7.27E-08	1.240		9.02E-08
10/23/98	8:10	8.7	57600		44.8	Y		44.0	107.4	97.3	6.91E-08	1.282		8.86E-08
	9:10	8.6	3600		44.3	Y		44.2	98.1	97.5	6.87E-08	1.284		8.82E-08
	10:10	8.5	3600		43.6	Y		43.8	97.6	97.1	5.75E-08	1.287		7.40E-08
	11:10	9.0	3600		42.6	Y		42.8	96.9	96.1	9.28E-08	1.274		1.18E-07
	12:10	9.4	3600		42.0	Y		42.3	95.9	95.6	3.51E-08	1.264		4.43E-08
	13:10	9.8	3600		41.2	Y		41.3	95.3	94.6	8.25E-08	1.255		1.04E-07
	14:10	10.2	3600		40.6	Y		40.8	94.5	94.1	4.75E-08	1.245		5.91E-08
	15:10	10.5	3600		39.9	Y		40.0	93.9	93.3	7.18E-08	1.237		8.88E-08
	16:10	10.6	3600		39.3	Y		39.3	93.2	92.6	7.23E-08	1.235		8.93E-08
	16:10	10.6	0		60.0	N		60.0	92.6	113.3		1.235		
10/26/98	8:00	11.1	229800		21.5	Y		21.4	113.3	74.7	7.31E-08	1.223		8.93E-08
	9:00	11.2	3600		21.0	Y		21.1	74.8	74.4	6.00E-08	1.220		7.32E-08
	10:00	11.4	3600		20.2	Y		20.4	74.3	73.7	9.08E-08	1.215		1.10E-07
	11:00	11.7	3600		19.6	Y		19.7	73.5	73.0	7.64E-08	1.208		9.23E-08
	12:00	12.0	3600		19.0	Y		19.2	72.9	72.5	6.16E-08	1.201		7.40E-08
	13:00	12.2	3600		18.5	Y		18.5	72.3	71.8	7.77E-08	1.196		9.29E-08
	14:00	12.4	3600		17.8	Y		17.8	71.8	71.1	1.10E-07	1.191		1.31E-07

BOUTWELL FIELD PERMEABILITY

114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER

STAGE I

g1 value= 4.0300E-02

GAUGE 007

Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
10/14/98	12:00	13.1			56.5			56.5		109.8				
	13:00	13.5	3600		54.1	Y		54.1	109.8	107.4	2.47E-07	1.164		2.88E-07
	14:00	13.8	3600		51.6	Y		51.7	107.4	105.0	2.53E-07	1.157		2.93E-07
	15:00	14.1	3600		49.5	Y		49.5	104.9	102.8	2.26E-07	1.149		2.60E-07
	16:00	14.4	3600		47.2	Y		47.2	102.8	100.5	2.53E-07	1.142		2.89E-07
	16:15	14.4	900		60.0	N		60.0	100.5	113.3		1.142		
10/15/98	8:30	12.5	58500		25.6	Y		25.3	113.3	78.6	2.52E-07	1.188		2.99E-07
	8:35	12.5	300		60.0	N		60.0	78.9	113.3		1.188		
	9:30	12.5	3300		57.6	Y		57.8	113.3	111.1	2.39E-07	1.188		2.85E-07
	10:30	12.8	3600		55.1	Y		55.1	110.9	108.4	2.55E-07	1.181		3.01E-07
	11:30	13.1	3600		52.5	Y		52.7	108.4	106.0	2.51E-07	1.174		2.94E-07
	12:30	13.5	3600		50.1	Y		50.2	105.8	103.5	2.46E-07	1.164		2.86E-07
	13:30	13.9	3600		47.7	Y		47.7	103.4	101.0	2.63E-07	1.154		3.03E-07
10/16/98	8:00	14.4	66600		60.0	N		59.8	101.0	113.1		1.142		
	9:00	14.3	3600		58.1	Y		58.2	113.3	111.5	1.79E-07	1.144		2.05E-07
	10:00	14.5	3600		56.6	Y		56.7	111.4	110.0	1.42E-07	1.139		1.61E-07
	11:00	14.7	3600		55.4	Y		55.6	109.9	108.9	1.02E-07	1.134		1.16E-07
	12:00	15.0	3600		54.3	Y		54.3	108.7	107.6	1.14E-07	1.127		1.28E-07
	13:00	15.1	3600		53.2	Y		53.2	107.6	106.5	1.15E-07	1.125		1.29E-07
	14:00	15.2	3600		52.2	Y		52.2	106.5	105.5	1.06E-07	1.122		1.19E-07
	15:00	15.3	3600		51.3	Y		51.3	105.5	104.6	9.59E-08	1.120		1.07E-07
	15:00	15.3	0		60.0	N		60.0	104.6	113.3		1.120		
10/19/98	8:10	12.8	234600		0.0	Y		-0.4	113.3	52.9	1.31E-07	1.181		1.55E-07
	8:10	12.7	0		60.0	N		60.0	53.3	113.3		1.183		
	9:10	12.6	3600		58.9	Y		58.9	113.3	112.2	1.09E-07	1.186		1.30E-07
	10:10	12.7	3600		57.8	Y		57.9	112.2	111.2	1.00E-07	1.183		1.19E-07
	11:10	12.9	3600		56.8	Y		56.9	111.1	110.2	9.11E-08	1.179		1.07E-07
	12:10	13.3	3600		55.7	Y		55.9	110.1	109.2	9.19E-08	1.169		1.07E-07
	13:10	13.4	3600		54.6	Y		54.7	109.0	108.0	1.03E-07	1.161		1.20E-07
	14:10	14.1	3600		53.6	Y		53.6	107.9	106.9	1.04E-07	1.149		1.20E-07
	15:10	14.2	3600		52.8	Y		52.9	106.9	106.2	7.35E-08	1.147		8.43E-08
10/20/98	8:10	12.4	61200		37.9	Y		37.3	106.1	90.6	1.04E-07	1.191		1.24E-07
	9:10	12.3	3600		37.0	Y		37.0	91.2	90.3	1.11E-07	1.193		1.32E-07
	10:10	12.2	3600		36.0	Y		36.1	90.3	89.4	1.12E-07	1.196		1.34E-07
	11:10	12.5	3600		34.9	Y		35.2	89.3	88.5	1.01E-07	1.188		1.20E-07
	12:10	12.8	3600		34.1	Y		34.1	88.2	87.4	1.02E-07	1.181		1.20E-07
	13:10	13.2	3600		33.3	Y		33.3	87.4	86.6	1.03E-07	1.171		1.21E-07
	14:10	13.5	3600		32.3	Y		32.4	86.6	85.7	1.17E-07	1.164		1.36E-07
	15:10	13.8	3600		31.5	Y		31.5	85.6	84.8	1.05E-07	1.157		1.22E-07
	16:10	13.8	3600		30.7	Y		30.7	84.8	84.0	1.06E-07	1.157		1.23E-07
10/21/98	8:10	11.5	57600		17.9	Y		17.3	84.0	70.6	1.22E-07	1.213		1.47E-07
	8:10	11.5	0		60.0	N		60.0	71.2	113.3		1.213		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 007

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	9:10	11.4	3600		59.0	Y		59.0	113.3	112.3	9.92E-08	1.215		1.21E-07
	10:10	11.5	3600		57.9	Y		58.0	112.3	111.3	1.00E-07	1.213		1.21E-07
	11:10	11.7	3600		56.8	Y		57.0	111.2	110.3	9.10E-08	1.208		1.10E-07
	12:10	12.1	3600		55.7	Y		55.8	110.1	109.1	1.02E-07	1.196		1.22E-07
	13:10	12.4	3600		54.9	Y		55.0	109.0	108.3	7.21E-08	1.191		8.59E-08
	14:10	12.8	3600		54.0	Y		54.0	108.2	107.3	9.35E-08	1.181		1.10E-07
	15:10	12.9	3600		53.5	Y		53.3	107.3	106.6	7.33E-08	1.179		8.64E-08
	16:10	12.9	3600		52.9	Y		52.8	106.8	106.1	7.36E-08	1.179		8.68E-08
10/22/98	8:10	9.0	57600		39.7	Y		38.7	106.2	92.0	1.00E-07	1.274		1.28E-07
	8:10	9.0	0		39.7	N		39.7	93.0	93.0		1.274		
	9:10	8.9	3600		39.1	Y		39.1	93.0	92.4	7.25E-08	1.277		9.25E-08
	10:10	8.6	3600		38.2	Y		38.2	92.4	91.5	1.10E-07	1.284		1.41E-07
	11:10	8.6	3600		37.3	Y		37.4	91.5	90.7	9.83E-08	1.284		1.26E-07
	12:10	8.8	3600		36.2	Y		36.4	90.6	89.7	1.12E-07	1.279		1.43E-07
	13:10	9.5	3600		35.3	Y		35.4	89.5	88.7	1.01E-07	1.262		1.27E-07
	14:10	9.9	3600		34.4	Y		34.6	88.6	87.9	8.88E-08	1.252		1.11E-07
	15:10	10.3	3600		33.4	Y		33.6	87.7	86.9	1.03E-07	1.242		1.27E-07
	16:10	10.4	3600		32.5	Y		32.5	86.7	85.8	1.17E-07	1.240		1.45E-07
10/23/98	8:10	8.7	57600		20.5	Y		19.7	85.8	73.0	1.13E-07	1.282		1.45E-07
	9:10	8.6	3600		19.9	Y		19.3	73.8	73.1	1.07E-07	1.284		1.37E-07
	10:10	8.5	3600		19.1	Y		19.3	73.2	72.6	9.21E-08	1.287		1.19E-07
	11:10	9.0	3600		17.9	Y		18.1	72.4	71.4	1.56E-07	1.274		1.98E-07
	12:10	9.4	3600		17.0	Y		17.3	71.2	70.6	9.47E-08	1.264		1.20E-07
	13:10	9.8	3600		16.1	Y		16.2	70.3	69.5	1.28E-07	1.255		1.61E-07
	14:10	10.2	3600		15.2	Y		15.4	69.4	68.7	1.13E-07	1.245		1.41E-07
	15:10	10.5	3600		14.4	Y		14.5	68.5	67.8	1.15E-07	1.237		1.42E-07
	16:10	10.6	3600		13.6	Y		13.6	67.7	66.9	1.33E-07	1.235		1.64E-07
	16:10	10.6	0		60.0	N		60.0	66.9	113.3		1.235		
10/26/98	8:00	11.1	229800		8.6	Y		8.5	113.3	61.8	1.06E-07	1.223		1.30E-07
	9:00	11.2	3600		7.8	Y		7.9	61.9	61.2	1.27E-07	1.220		1.55E-07
	10:00	11.4	3600		6.9	Y		7.1	61.1	60.4	1.29E-07	1.215		1.57E-07
	11:00	11.7	3600		6.1	Y		6.2	60.2	59.5	1.31E-07	1.208		1.58E-07
	12:00	12.0	3600		5.3	Y		5.5	59.4	58.8	1.14E-07	1.201		1.36E-07
	13:00	12.2	3600		4.5	Y		4.5	58.6	57.8	1.54E-07	1.196		1.84E-07
	14:00	12.4	3600		3.8	Y		3.8	57.8	57.1	1.36E-07	1.191		1.62E-07

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 008

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
10/14/98	12:00	13.1			53.3			53.3		106.6				
	13:00	13.5	3600		48.9	Y		48.9	106.6	102.2	4.72E-07	1.164		5.49E-07
	14:00	13.8	3600		44.4	Y		44.5	102.2	97.8	4.93E-07	1.157		5.70E-07
	15:00	14.1	3600		40.7	Y		40.7	97.7	94.0	4.32E-07	1.149		4.97E-07
	16:00	14.4	3600		36.9	Y		36.9	94.0	90.2	4.62E-07	1.142		5.27E-07
	16:15	14.4	900		60.0	N		60.0	90.2	113.3		1.142		
10/15/98	8:30	12.5	58500		5.6	Y		5.3	113.3	58.6	4.54E-07	1.188		5.40E-07
	8:35	12.5	300		60.0	N		60.0	58.9	113.3		1.188		
	9:30	12.5	3300		54.9	Y		55.1	113.3	108.4	5.40E-07	1.188		6.42E-07
	10:30	12.8	3600		50.3	Y		50.3	108.2	103.6	4.86E-07	1.181		5.74E-07
	11:30	13.1	3600		45.7	Y		45.9	103.6	99.2	4.86E-07	1.174		5.70E-07
	12:30	13.5	3600		41.4	Y		41.5	99.0	94.8	4.85E-07	1.164		5.65E-07
	13:30	13.9	3600		37.2	Y		37.2	94.7	90.5	5.08E-07	1.154		5.86E-07
10/16/98	8:00	14.4	66600		60.0	N		59.8	90.5	113.1		1.142		
	9:00	14.3	3600		58.2	Y		58.3	113.3	111.6	1.69E-07	1.144		1.94E-07
	10:00	14.5	3600		56.4	Y		56.5	111.5	109.8	1.72E-07	1.139		1.96E-07
	11:00	14.7	3600		51.8	Y		52.0	109.7	105.3	4.58E-07	1.134		5.20E-07
	12:00	15.0	3600		47.7	Y		47.7	105.1	101.0	4.45E-07	1.127		5.02E-07
	13:00	15.1	3600		43.9	Y		43.9	101.0	97.2	4.29E-07	1.125		4.83E-07
	14:00	15.2	3600		41.1	Y		41.1	97.2	94.4	3.27E-07	1.122		3.67E-07
	15:00	15.3	3600		38.3	Y		38.3	94.4	91.6	3.37E-07	1.120		3.77E-07
	15:00	15.3	0		60.0	N		60.0	91.6	113.3		1.120		
10/19/98	8:10	12.8	234600		0.0	Y		-0.4	113.3	52.9	1.31E-07	1.181		1.55E-07
	8:10	12.7	0		60.0	N		60.0	53.3	113.3		1.183		
	9:10	12.6	3600		56.6	Y		56.6	113.3	109.9	3.41E-07	1.186		4.04E-07
	10:10	12.7	3600		53.5	Y		53.6	109.9	106.9	3.10E-07	1.183		3.67E-07
	11:10	12.9	3600		50.9	Y		51.0	106.8	104.3	2.65E-07	1.179		3.13E-07
	12:10	13.3	3600		48.5	Y		48.7	104.2	102.0	2.39E-07	1.169		2.79E-07
	13:10	13.4	3600		46.3	Y		46.4	101.9	99.7	2.33E-07	1.166		2.72E-07
	14:10	14.1	3600		44.6	Y		44.6	99.8	97.9	1.93E-07	1.149		2.21E-07
	15:10	14.2	3600		43.0	Y		43.1	97.9	96.4	1.73E-07	1.147		1.98E-07
10/20/98	8:10	12.4	61200		28.9	Y		28.3	96.3	81.6	1.09E-07	1.191		1.30E-07
	9:10	12.3	3600		28.0	Y		28.0	82.2	81.3	1.23E-07	1.193		1.47E-07
	10:10	12.2	3600		27.2	Y		27.3	81.3	80.6	9.68E-08	1.195		1.16E-07
	11:10	12.5	3600		26.4	Y		26.7	80.5	80.0	6.97E-08	1.188		8.29E-08
	12:10	12.8	3600		25.7	Y		25.7	79.7	79.0	9.88E-08	1.181		1.17E-07
	13:10	13.2	3600		25.0	Y		25.0	79.0	78.3	9.96E-08	1.171		1.17E-07
	14:10	13.5	3600		24.2	Y		24.3	78.3	77.6	1.01E-07	1.164		1.17E-07
	15:10	13.8	3600		23.5	Y		23.5	77.5	76.8	1.02E-07	1.157		1.17E-07
	16:10	13.8	3600		22.8	Y		22.8	76.8	76.1	1.03E-07	1.157		1.19E-07
10/21/98	8:10	11.5	57600		12.7	Y		12.1	76.1	65.4	1.06E-07	1.213		1.29E-07
	8:10	11.5	0		60.0	N		60.0	66.0	113.3		1.213		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I

g1 value= 4.0300E-02

GAUGE 008

Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	9:10	11.4	3600		59.2	Y		59.2	113.3	112.3	7.93E-08	1.215		9.64E-08
	10:10	11.5	3600		58.1	Y		58.2	112.5	111.5	1.00E-07	1.213		1.21E-07
	11:10	11.7	3600		57.4	Y		57.6	111.4	110.9	5.04E-08	1.208		6.08E-08
	12:10	12.1	3600		56.5	Y		56.6	110.7	109.9	8.12E-08	1.198		9.73E-08
	13:10	12.4	3600		55.7	Y		55.8	109.8	109.1	7.16E-08	1.191		8.53E-08
	14:10	12.8	3600		55.0	Y		55.0	109.0	108.3	7.21E-08	1.181		8.52E-08
	15:10	12.9	3600		54.5	Y		54.3	108.3	107.6	7.26E-08	1.179		8.56E-08
	16:10	12.9	3600		53.9	Y		53.8	107.8	107.1	7.29E-08	1.179		8.60E-08
10/22/98	8:10	9.0	57600		43.2	Y		42.2	107.2	95.5	8.09E-08	1.274		1.03E-07
	8:10	9.0	0		43.2	N		43.2	96.5	96.5		1.274		
	9:10	8.9	3600		42.6	Y		42.6	96.5	95.9	6.98E-08	1.277		8.91E-08
	10:10	8.6	3600		41.9	Y		41.9	95.9	95.2	8.20E-08	1.284		1.05E-07
	11:10	8.6	3600		41.1	Y		41.2	95.2	94.5	8.26E-08	1.284		1.06E-07
	12:10	8.8	3600		40.2	Y		40.4	94.4	93.7	8.33E-08	1.279		1.07E-07
	13:10	9.5	3600		39.6	Y		39.7	93.5	93.0	6.00E-08	1.262		7.57E-08
	14:10	9.9	3600		38.8	Y		39.0	92.9	92.3	7.25E-08	1.252		9.08E-08
	15:10	10.3	3600		38.0	Y		38.2	92.1	91.5	7.32E-08	1.242		9.09E-08
	16:10	10.4	3600		37.2	Y		37.2	91.3	90.5	9.85E-08	1.240		1.22E-07
10/23/98	8:10	8.7	57600		27.5	Y		26.7	90.5	80.0	8.63E-08	1.282		1.11E-07
	9:10	8.6	3600		26.8	Y		26.7	80.8	80.0	1.11E-07	1.284		1.43E-07
	10:10	8.5	3600		26.1	Y		26.3	80.1	79.6	7.01E-08	1.287		9.02E-08
	11:10	9.0	3600		25.3	Y		25.5	79.4	78.8	8.49E-08	1.274		1.08E-07
	12:10	9.4	3600		24.5	Y		24.8	78.6	78.1	7.14E-08	1.264		9.03E-08
	13:10	9.8	3600		23.8	Y		23.9	77.8	77.2	8.67E-08	1.255		1.09E-07
	14:10	10.2	3600		23.1	Y		23.3	77.1	76.6	7.28E-08	1.245		9.07E-08
	15:10	10.5	3600		22.3	Y		22.4	76.4	75.7	1.03E-07	1.237		1.28E-07
	16:10	10.6	3600		21.6	Y		21.6	75.6	74.9	1.04E-07	1.235		1.29E-07
	16:10	10.6	0		60.0	N		60.0	74.9	113.3		1.235		
10/26/98	8:00	11.1	229800		19.7	Y		19.6	113.3	72.9	7.73E-08	1.223		9.46E-08
	9:00	11.2	3600		19.1	Y		19.2	73.0	72.5	7.69E-08	1.220		9.39E-08
	10:00	11.4	3600		18.4	Y		18.6	72.4	71.9	7.76E-08	1.215		9.43E-08
	11:00	11.7	3600		17.8	Y		17.9	71.7	71.2	7.83E-08	1.208		9.46E-08
	12:00	12.0	3600		17.1	Y		17.3	71.1	70.6	7.90E-08	1.201		9.49E-08
	13:00	12.2	3600		16.5	Y		16.5	70.4	69.8	9.58E-08	1.196		1.15E-07
	14:00	12.4	3600		16.0	Y		16.0	69.8	69.3	8.05E-08	1.191		9.58E-08

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 009

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
10/14/98	12:00	13.1			56.3			56.3		109.6				
	13:00	13.5	3600		53.2	Y		53.2	109.6	106.5	3.21E-07	1.164		3.74E-07
	14:00	13.8	3600		50.0	Y		50.1	106.5	103.4	3.32E-07	1.157		3.84E-07
	15:00	14.1	3600		47.3	Y		47.3	103.3	100.6	2.95E-07	1.149		3.39E-07
	16:00	14.4	3600		44.3	Y		44.3	100.6	97.6	3.39E-07	1.142		3.87E-07
	16:15	14.4	900		60.0	N		60.0	97.6	113.3		1.142		
10/15/98	8:30	12.5	58500		24.1	Y		23.8	113.3	77.1	2.65E-07	1.188		3.15E-07
	8:35	12.5	300		60.0	N		60.0	77.4	113.3		1.188		
	9:30	12.5	3300		58.2	Y		58.4	113.3	111.7	1.74E-07	1.188		2.06E-07
	10:30	12.8	3600		56.2	Y		56.2	111.5	109.5	2.03E-07	1.181		2.39E-07
	11:30	13.1	3600		54.1	Y		54.3	109.5	107.6	1.96E-07	1.174		2.30E-07
	12:30	13.5	3600		52.2	Y		52.3	107.4	105.6	1.89E-07	1.164		2.20E-07
	13:30	13.9	3600		49.7	Y		49.7	105.5	103.0	2.68E-07	1.154		3.10E-07
10/16/98	8:00	14.4	66600		60.0	N		59.8	103.0	113.1		1.142		
	9:00	14.3	3600		59.4	Y		59.5	113.3	112.8	4.95E-08	1.144		5.67E-08
	10:00	14.5	3600		58.8	Y		58.9	112.7	112.2	4.98E-08	1.139		5.67E-08
	11:00	14.7	3600		58.1	Y		58.3	112.1	111.6	5.00E-08	1.134		5.68E-08
	12:00	15.0	3600		57.5	Y		57.5	111.4	110.8	6.05E-08	1.127		6.81E-08
	13:00	15.1	3600		57.1	Y		57.1	110.8	110.4	4.05E-08	1.125		4.55E-08
	14:00	15.2	3600		56.5	Y		56.5	110.4	109.9	6.10E-08	1.122		6.85E-08
	15:00	15.3	3600		56.0	Y		56.0	109.8	109.3	5.11E-08	1.120		5.72E-08
	15:00	15.3	0		60.0	N		60.0	109.3	113.3		1.120		
10/19/98	8:10	12.8	234600		21.4	Y		21.0	113.3	74.3	7.25E-08	1.181		8.56E-08
	8:10	12.7	0		60.0	N		60.0	74.7	113.3		1.183		
	9:10	12.6	3600		59.6	Y		59.6	113.3	112.9	3.96E-08	1.186		4.70E-08
	10:10	12.7	3600		58.9	Y		59.0	112.9	112.3	5.97E-08	1.183		7.06E-08
	11:10	12.9	3600		58.3	Y		58.4	112.2	111.7	5.00E-08	1.179		5.89E-08
	12:10	13.3	3600		57.5	Y		57.7	111.6	111.0	6.03E-08	1.169		7.05E-08
	13:10	13.4	3600		56.8	Y		56.9	110.8	110.2	6.08E-08	1.166		7.09E-08
	14:10	14.1	3600		56.2	Y		56.2	110.1	109.5	6.12E-08	1.149		7.03E-08
	15:10	14.2	3600		55.6	Y		55.7	109.5	109.0	5.12E-08	1.147		5.87E-08
10/20/98	8:10	12.4	61200		45.2	Y		44.6	108.9	97.9	7.01E-08	1.191		8.35E-08
	9:10	12.3	3600		44.6	Y		44.6	98.5	97.9	6.84E-08	1.193		8.16E-08
	10:10	12.2	3600		44.0	Y		44.1	97.9	97.4	5.73E-08	1.196		6.85E-08
	11:10	12.5	3600		43.1	Y		43.4	97.3	96.7	6.92E-08	1.188		8.23E-08
	12:10	12.8	3600		42.5	Y		42.5	96.4	95.8	6.99E-08	1.181		8.25E-08
	13:10	13.2	3600		41.9	Y		41.9	95.3	95.2	7.03E-08	1.171		8.24E-08
	14:10	13.5	3600		41.3	Y		41.5	95.2	94.7	5.89E-08	1.164		6.86E-08
	15:10	13.8	3600		40.7	Y		40.7	94.6	94.0	7.12E-08	1.157		8.24E-08
	16:10	13.8	3600		40.1	Y		40.1	94.0	93.4	7.17E-08	1.157		8.29E-08
10/21/98	8:10	11.5	57600		30.8	Y		30.2	93.4	83.5	7.84E-08	1.213		9.51E-08
	8:10	11.5	0		30.5	Y		30.5	84.1	83.8	#DIV/0!	1.213		#DIV/0!

BOUTWELL FIELD PERMEABILITY

114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER

STAGE I

g1 value= 4.0300E-02

GAUGE 009

Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	9:10	11.4	3600		30.3	Y		30.3	83.8	83.6	2.67E-08	1.215		3.25E-08
	10:10	11.5	3600		29.5	Y		29.6	83.6	82.9	9.41E-08	1.213		1.14E-07
	11:10	11.7	3600		28.9	Y		29.1	82.8	82.4	5.42E-08	1.208		6.55E-08
	12:10	12.1	3600		28.2	Y		28.3	82.2	81.6	8.20E-08	1.198		9.83E-08
	13:10	12.4	3600		27.7	Y		27.8	81.5	81.1	5.51E-08	1.191		6.56E-08
	14:10	12.8	3600		27.1	Y		27.1	81.0	80.4	8.32E-08	1.181		9.83E-08
	15:10	12.9	3600		26.8	Y		26.6	80.4	79.9	6.98E-08	1.179		8.23E-08
	16:10	12.9	3600		26.4	Y		26.3	80.1	79.6	7.01E-08	1.179		8.26E-08
10/22/98	8:10	9.0	57600		17.2	Y		16.2	79.7	69.5	9.58E-08	1.274		1.22E-07
	8:10	9.0	0		60.0	N		60.0	70.5	113.3		1.274		
	9:10	8.9	3600		59.5	Y		59.5	113.3	112.8	4.95E-08	1.277		6.32E-08
	10:10	8.6	3600		58.9	Y		58.9	112.8	112.2	5.97E-08	1.284		7.67E-08
	11:10	8.6	3600		58.2	Y		58.3	112.2	111.6	6.00E-08	1.284		7.71E-08
	12:10	8.8	3600		57.3	Y		57.5	111.5	110.8	7.05E-08	1.279		9.02E-08
	13:10	9.5	3600		56.6	Y		56.7	110.6	110.0	6.09E-08	1.262		7.68E-08
	14:10	9.9	3600		55.9	Y		56.1	109.9	109.4	5.10E-08	1.252		6.39E-08
	15:10	10.3	3600		55.3	Y		55.5	109.2	108.8	4.11E-08	1.242		5.10E-08
	16:10	10.4	3600		54.7	Y		54.7	108.6	108.0	6.20E-08	1.240		7.69E-08
10/23/98	8:10	8.7	57600		45.7	Y		44.9	108.0	98.2	6.66E-08	1.282		8.53E-08
	9:10	8.6	3600		45.1	Y		45.0	99.0	98.3	7.94E-08	1.284		1.02E-07
	10:10	8.5	3600		44.5	Y		44.7	98.4	98.0	4.56E-08	1.287		5.87E-08
	11:10	9.0	3600		43.7	Y		43.9	97.8	97.2	6.89E-08	1.274		8.78E-08
	12:10	9.4	3600		43.0	Y		43.3	97.0	96.6	4.63E-08	1.264		5.85E-08
	13:10	9.8	3600		42.4	Y		42.5	96.3	95.8	5.83E-08	1.255		7.31E-08
	14:10	10.2	3600		41.8	Y		42.0	95.7	95.3	4.69E-08	1.245		5.84E-08
	15:10	10.5	3600		41.2	Y		41.3	95.1	94.6	5.90E-08	1.237		7.30E-08
	16:10	10.6	3600		40.6	Y		40.6	94.5	93.9	7.13E-08	1.235		8.81E-08
	16:10	10.6	0		60.0	N		60.0	93.9	113.3		1.235		
10/26/98	8:00	11.1	229800		23.2	Y		23.1	113.3	76.4	6.91E-08	1.223		8.45E-08
	9:00	11.2	3600		22.7	Y		22.8	76.5	76.1	5.87E-08	1.220		7.16E-08
	10:00	11.4	3600		22.1	Y		22.3	76.0	75.6	5.91E-08	1.215		7.18E-08
	11:00	11.7	3600		21.6	Y		21.7	75.4	75.0	5.95E-08	1.208		7.19E-08
	12:00	12.0	3600		21.0	Y		21.2	74.9	74.5	5.99E-08	1.201		7.20E-08
	13:00	12.2	3600		20.4	Y		20.4	74.3	73.7	9.08E-08	1.196		1.09E-07
	14:00	12.4	3600		19.9	Y		19.9	73.7	73.2	7.62E-08	1.191		9.07E-08

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 010

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
10/14/98	12:00	13.1			52.1			52.1		105.4				
	13:00	13.5	3600		47.5	Y		47.5	105.4	100.8	5.00E-07	1.164		5.81E-07
	14:00	13.8	3600		42.7	Y		42.8	100.8	96.1	5.35E-07	1.157		6.18E-07
	15:00	14.1	3600		39.0	Y		39.0	96.0	92.3	4.40E-07	1.149		5.06E-07
	16:00	14.4	3600		34.6	Y		34.6	92.3	87.9	5.47E-07	1.142		6.24E-07
	16:15	14.4	900		60.0	N		60.0	87.9	113.3		1.142		
10/15/98	8:30	12.5	58500		5.2	Y		4.9	113.3	58.2	4.59E-07	1.188		5.45E-07
	8:35	12.5	300		60.0	N		60.0	58.5	113.3		1.188		
	9:30	12.5	3300		55.9	Y		56.1	113.3	109.4	4.28E-07	1.188		5.08E-07
	10:30	12.8	3600		52.3	Y		52.3	109.2	105.6	3.75E-07	1.181		4.43E-07
	11:30	13.1	3600		48.7	Y		48.9	105.6	102.2	3.66E-07	1.174		4.30E-07
	12:30	13.5	3600		45.3	Y		45.4	102.0	98.7	3.68E-07	1.164		4.28E-07
	13:30	13.9	3600		40.1	Y		40.1	98.6	93.4	6.07E-07	1.154		7.00E-07
10/16/98	8:00	14.4	66600		60.0	N		59.8	93.4	113.1		1.142		
	9:00	14.3	3600		59.3	Y		59.4	113.3	112.7	5.94E-08	1.144		6.80E-08
	10:00	14.5	3600		58.3	Y		58.4	112.6	111.7	8.98E-08	1.139		1.02E-07
	11:00	14.7	3600		57.5	Y		57.7	111.6	111.0	6.03E-08	1.134		6.85E-08
	12:00	15.0	3600		56.8	Y		56.8	110.8	110.1	7.09E-08	1.127		8.00E-08
	13:00	15.1	3600		56.0	Y		56.0	110.1	109.3	8.16E-08	1.125		9.18E-08
	14:00	15.2	3600		55.3	Y		55.3	109.3	108.6	7.19E-08	1.122		8.07E-08
	15:00	15.3	3600		54.6	Y		54.6	108.6	107.9	7.24E-08	1.120		8.11E-08
	15:00	15.3	0		60.0	N		60.0	107.9	113.3		1.120		
10/19/98	8:10	12.8	234600		7.9	Y		7.5	113.3	60.8	1.07E-07	1.181		1.26E-07
	8:10	12.7	0		60.0	N		60.0	61.2	113.3		1.183		
	9:10	12.6	3600		59.2	Y		59.2	113.3	112.5	7.93E-08	1.186		9.41E-08
	10:10	12.7	3600		58.2	Y		58.3	112.5	111.6	8.99E-08	1.183		1.06E-07
	11:10	12.9	3600		57.4	Y		57.5	111.5	110.8	7.05E-08	1.179		8.31E-08
	12:10	13.3	3600		56.4	Y		56.6	110.7	109.9	8.12E-08	1.169		9.49E-08
	13:10	13.4	3600		55.5	Y		55.6	109.7	108.9	8.19E-08	1.166		9.56E-08
	14:10	14.1	3600		54.5	Y		54.5	108.8	107.8	1.03E-07	1.149		1.19E-07
	15:10	14.2	3600		53.7	Y		53.8	107.8	107.1	7.29E-08	1.147		8.36E-08
10/20/98	8:10	12.4	61200		39.8	Y		39.2	107.0	92.5	9.59E-08	1.191		1.14E-07
	9:10	12.3	3600		39.0	Y		39.0	93.1	92.3	9.66E-08	1.193		1.15E-07
	10:10	12.2	3600		38.2	Y		38.3	92.3	91.6	8.52E-08	1.196		1.02E-07
	11:10	12.5	3600		37.1	Y		37.4	91.5	90.7	9.83E-08	1.188		1.17E-07
	12:10	12.8	3600		36.2	Y		36.2	90.4	89.5	1.12E-07	1.181		1.32E-07
	13:10	13.2	3600		35.5	Y		35.5	89.5	88.8	8.79E-08	1.171		1.03E-07
	14:10	13.5	3600		34.7	Y		34.8	88.8	88.1	8.86E-08	1.164		1.03E-07
	15:10	13.8	3600		33.9	Y		33.9	88.0	87.2	1.02E-07	1.157		1.18E-07
	16:10	13.8	3600		33.1	Y		33.1	87.2	86.4	1.03E-07	1.157		1.19E-07
10/21/98	8:10	11.5	57600		20.6	Y		20.0	86.4	73.3	1.15E-07	1.213		1.40E-07
	8:10	11.5	0		60.0	N		60.0	73.9	113.3		1.213		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - IN SITU LINER
STAGE I
GAUGE 010

g1 value= 4.0300E-02
Housing Height = 53.3

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	9:10	11.4	3600		59.2	Y		59.2	113.3	112.5	7.93E-08	1.215		9.64E-08
	10:10	11.5	3600		58.2	Y		58.3	112.5	111.6	8.99E-08	1.213		1.09E-07
	11:10	11.7	3600		57.2	Y		57.4	111.5	110.7	8.06E-08	1.208		9.74E-08
	12:10	12.1	3600		56.2	Y		56.3	110.5	109.6	9.15E-08	1.198		1.10E-07
	13:10	12.4	3600		55.5	Y		55.6	109.5	108.9	6.15E-08	1.191		7.32E-08
	14:10	12.8	3600		54.6	Y		54.6	108.8	107.9	9.30E-08	1.181		1.10E-07
	15:10	12.9	3600		54.0	Y		53.8	107.9	107.1	8.33E-08	1.179		9.82E-08
	16:10	12.9	3600		53.3	Y		53.2	107.3	106.5	8.38E-08	1.179		9.87E-08
10/22/98	8:10	9.0	57600		40.5	Y		39.5	106.6	92.8	9.70E-08	1.274		1.24E-07
	8:10	9.0	0		40.5	N		40.5	93.8	93.8		1.274		
	9:10	8.9	3600		39.9	Y		39.9	93.8	93.2	7.18E-08	1.277		9.17E-08
	10:10	8.6	3600		39.1	Y		39.1	93.2	92.4	9.65E-08	1.284		1.24E-07
	11:10	8.6	3600		38.2	Y		38.3	92.4	91.6	9.73E-08	1.284		1.25E-07
	12:10	8.8	3600		37.3	Y		37.5	91.5	90.8	8.60E-08	1.279		1.10E-07
	13:10	9.5	3600		36.3	Y		36.4	90.6	89.7	1.12E-07	1.262		1.41E-07
	14:10	9.9	3600		35.5	Y		35.7	89.6	89.0	7.52E-08	1.252		9.42E-08
	15:10	10.3	3600		34.7	Y		34.9	88.8	88.2	7.59E-08	1.242		9.43E-08
	16:10	10.4	3600		34.0	Y		34.0	88.0	87.3	8.94E-08	1.240		1.11E-07
10/23/98	8:10	8.7	57600		22.0	Y		21.2	87.3	74.5	1.11E-07	1.282		1.42E-07
	9:10	8.6	3600		21.3	Y		21.2	75.3	74.5	1.20E-07	1.284		1.54E-07
	10:10	8.5	3600		20.6	Y		20.8	74.6	74.1	7.53E-08	1.267		9.69E-08
	11:10	9.0	3600		19.5	Y		19.7	73.9	73.0	1.37E-07	1.274		1.75E-07
	12:10	9.4	3600		18.8	Y		19.1	72.8	72.4	6.17E-08	1.264		7.80E-08
	13:10	9.8	3600		17.9	Y		18.0	72.1	71.3	1.25E-07	1.255		1.57E-07
	14:10	10.2	3600		17.1	Y		17.3	71.2	70.6	9.47E-08	1.245		1.18E-07
	15:10	10.5	3600		16.3	Y		16.4	70.4	69.7	1.12E-07	1.237		1.38E-07
	16:10	10.6	3600		15.5	Y		15.5	69.6	68.8	1.29E-07	1.235		1.60E-07
	16:10	10.6	0		60.0	N		60.0	68.8	113.3		1.235		
10/26/98	8:00	11.1	229800		10.4	Y		10.3	113.3	63.6	1.01E-07	1.223		1.24E-07
	9:00	11.2	3600		9.6	Y		9.7	63.7	63.0	1.24E-07	1.220		1.51E-07
	10:00	11.4	3600		8.8	Y		9.0	62.9	62.3	1.07E-07	1.215		1.30E-07
	11:00	11.7	3600		8.0	Y		8.1	62.1	61.4	1.27E-07	1.208		1.53E-07
	12:00	12.0	3600		7.2	Y		7.4	61.3	60.7	1.10E-07	1.201		1.32E-07
	13:00	12.2	3600		6.5	Y		6.5	60.5	59.8	1.30E-07	1.196		1.56E-07
	14:00	12.4	3600		5.7	Y		5.7	59.8	59.0	1.51E-07	1.191		1.80E-07

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II TEMPERATURE EFFECT GUAGE

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Temp Correct	k' cm/sec
11/2/98	10:00	10.9			54.2							
	11:00	11.1	3600		54.2		0.0				1.223	
	11:00	11.1	0		54.2		0.0				1.223	
	12:00	11.2	3600		54.1		0.1				1.220	
	12:00	11.2	0		54.1		0.0				1.220	
	13:00	11.2	3600		54.1		0.0				1.220	
	13:00	11.2	0		54.2		-0.1				1.220	
	14:00	11.2	3600		54.2		0.0				1.220	
	14:00	11.2	0		54.2		0.0				1.220	
	15:00	11.3	3600		54.1		0.1				1.218	
11/3/98	8:00	8.2	61200		55.0		-0.9				1.294	
	9:00	8.3	3600		54.9		0.1				1.291	
	9:00	8.3	0		54.9		0.0				1.291	
	10:00	8.6	3600		54.8		0.1				1.284	
	10:00	8.6	0		54.8		0.0				1.284	
	11:00	8.8	3600		54.8		0.0				1.279	
	11:00	8.8	0		54.8		0.0				1.279	
	12:00	9.0	3600		54.6		0.2				1.274	
	12:00	9.0	0		54.6		0.0				1.274	
	13:00	9.3	3600		54.6		0.0				1.267	
	13:00	9.3	0		54.5		0.1				1.267	
	14:00	9.5	3600		54.5		0.0				1.262	
	14:00	9.5	0		54.5		0.0				1.262	
	15:00	9.6	3600		54.5		0.0				1.260	
11/4/98	8:00	6.6	61200		55.8		-1.3				1.333	
	9:00	6.6	3600		55.8		0.0				1.333	
	10:00	6.6	3600		55.8		0.0				1.333	
	10:00	6.6	0		55.8		0.0				1.333	
	11:00	6.7	3600		55.7		0.1				1.331	
	11:00	6.7	0		55.7		0.0				1.331	
	12:00	6.9	3600		55.4		0.3				1.326	
	12:00	6.9	0		55.4		0.0				1.326	
	13:00	7.2	3600		55.2		0.2				1.318	
	13:00	7.2	0		55.2		0.0				1.318	
	14:00	7.5	3600		55.1		0.1				1.311	
	14:00	7.5	0		55.1		0.0				1.311	
	15:00	7.7	3600		55.0		0.1				1.306	
11/5/98	10:00	5.8	68400		56.0		-1.0				1.353	
	11:00	5.8	3600		56.0		0.0				1.353	
	11:00	6.0	0		55.8		0.2				1.348	
	12:00	6.0	3600		55.8		0.2				1.348	
	12:00	6.3	0		55.8		0.0				1.340	
	13:00	6.3	3600		55.5		0.1				1.340	
	13:00	6.5	0		55.5		0.0				1.336	
	14:00	6.5	3600		55.4		0.1				1.336	
	14:30	6.8	1800		55.3		0.1				1.328	

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II TEMPERATURE EFFECT GUAGE

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Temp Correct	k' cm/sec
	14:30	6.6	0		55.3		0.0				1.328	
	15:00	6.9	1800		55.3		0.0				1.326	
	15:30	6.9	1800		55.3		0.0				1.326	
11/6/98	7:30	6.6	57600		55.7		-0.4				1.333	
	8:00	6.6	1800		55.7		0.0				1.333	
	9:00	6.5	3600		55.7		0.0				1.336	
	9:30	6.6	1800		55.6		0.1				1.333	
	10:00	6.6	1800		55.5		0.1				1.333	
	10:00	6.6	0		55.5		0.0				1.333	
	10:30	6.7	1800		55.4		0.1				1.331	
	11:00	6.8	1800		55.4		0.0				1.328	
	11:30	6.9	1800		55.3		0.1				1.326	
	11:30	6.9	0		55.3		0.0				1.326	
	12:00	7.1	1800		55.2		0.1				1.321	
	12:30	7.2	1800		55.1		0.1				1.318	
	12:30	7.2	0		55.1		0.0				1.318	
	13:00	7.4	1800		55.1		0.0				1.313	
	13:00	7.4	0		55.1		0.0				1.313	
	13:30	7.5	1800		55.1		0.0				1.311	
	14:00	7.6	1800		55.0		0.1				1.309	

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 006

g1 value= 1.5120E-02

Housing Height = 62.8

Date	Time	Temp	Delta T(sec)	Field Reading		Calculate	Field Corrections		Plus Perm Housing		k	Calc. Temp	Det. Temp	k'
m/d/y		deg C	(sec)	h1	h2	Perm.	h1c	h2c	h1c	h2c	cm/sec	Correct	Correct	cm/sec
11/2/98	10:00	10.9			60.0			60.0		122.8				
	11:00	11.1	3600		22.6	Y		22.6	122.8	85.4	1.53E-06	1.223		1.87E-06
	11:00	11.1	0		60.0	N		60.0	85.4	122.8		1.223		
	12:00	11.2	3600		23.5	Y		23.6	122.8	86.4	1.48E-06	1.220		1.80E-06
	12:00	11.2	0		60.0	N		60.0	86.3	122.8		1.220		
	13:00	11.2	3600		22.4	Y		22.4	122.8	85.2	1.54E-06	1.220		1.87E-06
	13:00	11.2	0		60.0	N		59.9	85.2	122.7		1.220		
	14:00	11.2	3600		24.9	Y		24.9	122.8	87.7	1.41E-06	1.220		1.73E-06
	14:00	11.2	0		60.0	N		60.0	87.7	122.8		1.220		
	15:00	11.3	3600		25.2	Y		25.3	122.8	88.1	1.39E-06	1.218		1.70E-06
11/3/98	8:00	8.2	61200		60.0	N		59.1	88.0	121.9		1.294		
	9:00	8.3	3600		22.6	Y		22.7	122.8	85.5	1.52E-06	1.291		1.96E-06
	9:00	8.3	0		60.0	N		60.0	85.4	122.8		1.291		
	10:00	8.6	3600		25.6	Y		25.7	122.8	88.5	1.38E-06	1.284		1.77E-06
	10:00	8.6	0		60.0	N		60.0	88.4	122.8		1.284		
	11:00	8.8	3600		26.2	Y		26.2	122.8	89.0	1.35E-06	1.279		1.73E-06
	11:00	8.8	0		60.0	N		60.0	89.0	122.8		1.279		
	12:00	9.0	3600		29.1	Y		29.3	122.8	92.1	1.21E-06	1.274		1.54E-06
	12:00	9.0	0		60.0	N		60.0	91.9	122.8		1.274		
	13:00	9.3	3600		28.7	Y		28.7	122.8	91.5	1.24E-06	1.267		1.57E-06
	13:00	9.3	0		60.0	N		60.1	91.5	122.9		1.267		
	14:00	9.5	3600		28.7	Y		28.7	122.8	91.5	1.24E-06	1.262		1.56E-06
	14:00	9.5	0		60.0	N		60.0	91.5	122.8		1.262		
	15:00	9.6	3600		28.9	Y		28.9	122.8	91.7	1.23E-06	1.260		1.54E-06
11/4/98	8:00	6.6	61200		60.0	N		58.7	91.7	121.5		1.333		
	9:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	3600		21.9	Y		21.9	122.8	84.7	1.56E-06	1.333		2.08E-06
	10:00	6.6	0		60.0	N		60.0	84.7	122.8		1.333		
	11:00	6.7	3600		27.0	Y		27.1	122.8	89.9	1.31E-06	1.331		1.74E-06
	11:00	6.7	0		60.0	N		60.0	89.8	122.8		1.331		
	12:00	6.9	3600		25.1	Y		25.4	122.8	88.2	1.39E-06	1.326		1.84E-06
	12:00	6.9	0		60.0	N		60.0	87.9	122.8		1.326		
	13:00	7.2	3600		28.3	Y		28.5	122.8	91.3	1.24E-06	1.318		1.64E-06
	13:00	7.2	0		60.0	N		60.0	91.1	122.8		1.318		
	14:00	7.5	3600		29.1	Y		29.2	122.8	92.0	1.21E-06	1.311		1.59E-06
	14:00	7.5	0		60.0	N		60.0	91.9	122.8		1.311		
	15:00	7.7	3600		30.6	Y		30.7	122.8	93.5	1.14E-06	1.306		1.50E-06
11/5/98	10:00	5.8	68400		60.0	N		59.0	93.4	121.8		1.353		
	11:00	5.8	3600		24.3	Y		24.3	122.8	87.1	1.44E-06	1.353		1.95E-06
	11:00	6.0	0		60.0	N		60.2	87.1	123.0		1.348		
	12:00	6.0	3600		28.6	Y		28.8	122.8	91.6	1.23E-06	1.348		1.66E-06
	12:00	6.3	0		60.0	N		60.0	91.4	122.8		1.340		
	13:00	6.5	3600		29.4	Y		29.5	122.8	92.3	1.20E-06	1.340		1.61E-06
	13:00	6.5	0		60.0	N		60.0	92.2	122.8		1.336		
	14:00	6.5	3600		31.4	Y		31.5	122.8	94.3	1.11E-06	1.336		1.48E-06

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II

g1 value= 1.5120E-02

GAUGE 006

Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Del. Temp Correct	k' cm/sec
	14:30	6.8	1800		20.5	Y		20.6	94.2	83.4	1.02E-06	1.326		1.36E-06
	14:30	6.8	0		60.0	N		60.0	83.3	122.8		1.328		
	15:00	6.9	1800		42.1	Y		42.1	122.8	104.9	1.32E-06	1.326		1.75E-06
	15:30	6.9	1800		24.5	Y		24.5	104.9	87.3	1.54E-06	1.326		2.05E-06
11/6/98	7:30	6.6	57600		60.0	N		59.6	87.3	122.4		1.333		
	8:00	6.6	1800		60.0	N		60.0	122.8	122.8		1.333		
	9:00	6.5	3600		29.2	Y		29.2	122.8	92.0	1.21E-06	1.336		1.62E-06
	9:30	6.6	1800		18.2	Y		18.3	92.0	81.1	1.06E-06	1.333		1.41E-06
	10:00	6.6	1800		8.7	Y		8.8	81.0	71.6	1.04E-06	1.333		1.38E-06
	10:00	6.6	0		60.0	N		60.0	71.5	122.8		1.333		
	10:30	6.7	1800		41.7	Y		41.8	122.8	104.6	1.35E-06	1.331		1.79E-06
	11:00	6.8	1800		28.1	Y		28.1	104.5	90.9	1.17E-06	1.328		1.56E-06
	11:30	6.9	1800		17.9	Y		18.0	90.9	80.8	9.89E-07	1.326		1.31E-06
	11:30	6.9	0		60.0	N		60.0	80.7	122.8		1.326		
	12:00	7.1	1800		40.1	Y		40.2	122.8	103.0	1.48E-06	1.321		1.95E-06
	12:30	7.2	1800		27.2	Y		27.3	102.9	90.1	1.12E-06	1.318		1.47E-06
	12:30	7.2	0		27.2	N		27.2	90.0	90.0		1.318		
	13:00	7.4	1800		17.4	Y		17.4	90.0	80.2	9.68E-07	1.313		1.27E-06
	13:00	7.4	0		60.0	N		60.0	80.2	122.8		1.313		
	13:30	7.5	1800		40.4	Y		40.4	122.8	103.2	1.48E-06	1.311		1.91E-06
	14:00	7.6	1800		28.4	Y		28.5	103.2	91.3	1.03E-06	1.309		1.35E-06

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II

g1 value= 1.5120E-02

GAUGE 007

Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
11/2/98	10:00	10.9			60.0			60.0		122.8				
	11:00	11.1	3600		48.1	Y		48.1	122.8	110.9	4.28E-07	1.223		5.23E-07
	11:00	11.1	0		48.1	N		48.1	110.9	110.9		1.223		
	12:00	11.2	3600		37.3	Y		37.4	110.9	100.2	4.26E-07	1.220		5.20E-07
	12:00	11.2	0		37.3	N		37.3	100.1	100.1		1.220		
	13:00	11.2	3600		27.3	Y		27.3	100.1	90.1	4.42E-07	1.220		5.39E-07
	13:00	11.2	0		27.3	N		27.2	90.1	90.0		1.220		
	14:00	11.2	3600		19.1	Y		19.1	90.1	81.9	4.01E-07	1.220		4.89E-07
	14:00	11.2	0		19.1	N		19.1	81.9	81.9		1.220		
	15:00	11.3	3600		11.4	Y		11.5	81.9	74.3	4.09E-07	1.218		4.98E-07
11/3/98	8:00	8.2	61200		60.0	N		59.1	74.2	121.9		1.294		
	9:00	8.3	3600		47.0	Y		47.1	122.8	109.9	4.66E-07	1.291		6.02E-07
	9:00	8.3	0		47.0	N		47.0	109.8	109.8		1.291		
	10:00	8.6	3600		36.9	Y		37.0	109.8	99.8	4.01E-07	1.284		5.15E-07
	10:00	8.6	0		36.9	N		36.9	99.7	99.7		1.284		
	11:00	8.8	3600		27.8	Y		27.8	99.7	90.6	4.02E-07	1.279		5.14E-07
	11:00	8.8	0		27.8	N		27.8	90.6	90.6		1.279		
	12:00	9.0	3600		20.3	Y		20.5	90.6	83.3	3.53E-07	1.274		4.50E-07
	12:00	9.0	0		20.3	N		20.3	83.1	83.1		1.274		
	13:00	9.3	3600		13.3	Y		13.3	83.1	76.1	3.70E-07	1.267		4.68E-07
	13:00	9.3	0		13.3	N		13.4	76.1	76.2		1.267		
	14:00	9.5	3600		6.8	Y		6.8	76.1	69.6	3.75E-07	1.262		4.73E-07
	14:00	9.5	0		60.0	N		60.0	69.6	122.8		1.262		
	15:00	9.6	3600		53.1	Y		53.1	122.8	115.9	2.43E-07	1.260		3.06E-07
11/4/98	8:00	6.6	61200		60.0	N		58.7	115.9	121.5		1.333		
	9:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	3600		47.2	Y		47.2	122.8	110.0	4.62E-07	1.333		6.16E-07
	10:00	6.6	0		47.2	N		47.2	110.0	110.0		1.333		
	11:00	6.7	3600		37.5	Y		37.6	110.0	100.4	3.84E-07	1.331		5.10E-07
	11:00	6.7	0		37.5	N		37.5	100.3	100.3		1.331		
	12:00	6.9	3600		28.0	Y		28.3	100.3	91.1	4.04E-07	1.326		5.36E-07
	12:00	6.9	0		28.0	N		28.0	90.8	90.8		1.326		
	13:00	7.2	3600		20.4	Y		20.6	90.8	83.4	3.57E-07	1.318		4.71E-07
	13:00	7.2	0		20.4	N		20.4	83.2	83.2		1.318		
	14:00	7.5	3600		13.4	Y		13.5	83.2	76.3	3.64E-07	1.311		4.77E-07
	14:00	7.5	0		13.4	N		13.4	76.2	76.2		1.311		
	15:00	7.7	3600		6.6	Y		6.7	76.2	69.5	3.87E-07	1.306		5.05E-07
11/5/98	10:00	5.8	68400		60.0	N		59.0	69.4	121.8		1.353		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 007

g1 value= 1.5120E-02
Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	11:00	5.8	3600		47.8	Y		47.8	122.8	110.6	4.39E-07	1.353		5.94E-07
	11:00	6.0	0		47.8	N		48.0	110.6	110.8		1.348		
	12:00	6.0	3600		38.6	Y		38.8	110.6	101.6	3.56E-07	1.348		4.80E-07
	12:00	6.3	0		38.6	N		38.6	101.4	101.4		1.340		
	13:00	6.3	3600		30.3	Y		30.4	101.4	93.2	3.54E-07	1.340		4.75E-07
	13:00	6.5	0		30.3	N		30.3	93.1	93.1		1.336		
	14:00	6.5	3600		23.2	Y		23.3	93.1	86.1	3.28E-07	1.336		4.38E-07
	14:30	6.8	1800		19.7	Y		19.8	86.0	82.6	3.39E-07	1.328		4.50E-07
	14:30	6.8	0		60.0	N		60.0	82.5	122.8		1.328		
	15:00	6.9	1800		54.1	Y		54.1	122.8	116.9	4.14E-07	1.326		5.48E-07
	15:30	6.9	1800		48.2	Y		48.2	116.9	111.0	4.35E-07	1.326		5.77E-07
11/6/98	7:30	6.6	57600		60.0	N		59.6	111.0	122.4		1.333		
	8:00	6.6	1800		53.7	Y		53.7	122.8	116.5	4.42E-07	1.333		5.90E-07
	9:00	6.5	3600		43.8	Y		43.8	116.5	106.6	3.73E-07	1.336		4.98E-07
	9:30	6.6	1800		39.3	Y		39.4	106.6	102.2	3.54E-07	1.333		4.72E-07
	10:00	6.6	1800		35.0	Y		35.1	102.1	97.9	3.53E-07	1.333		4.70E-07
	10:00	6.6	0		35.0	N		35.0	97.8	97.8		1.333		
	10:30	6.7	1800		31.1	Y		31.2	97.8	94.0	3.33E-07	1.331		4.43E-07
	11:00	6.8	1800		27.2	Y		27.2	93.9	90.0	3.56E-07	1.328		4.73E-07
	11:30	6.9	1800		23.7	Y		23.8	90.0	86.6	3.23E-07	1.326		4.29E-07
	11:30	6.9	0		23.7	N		23.7	86.5	86.5		1.326		
	12:00	7.1	1800		20.2	Y		20.3	86.5	83.1	3.37E-07	1.321		4.45E-07
	12:30	7.2	1800		16.8	Y		16.9	83.0	79.7	3.41E-07	1.318		4.49E-07
	12:30	7.2	0		16.8	N		16.8	79.6	79.6		1.318		
	13:00	7.4	1800		13.8	Y		13.8	79.6	76.6	3.23E-07	1.313		4.24E-07
	13:00	7.4	0		13.8	N		13.8	76.6	76.6		1.313		
	13:30	7.5	1800		10.7	Y		10.7	76.6	73.5	3.47E-07	1.311		4.55E-07
	14:00	7.6	1800		7.7	Y		7.8	73.5	70.6	3.38E-07	1.309		4.42E-07

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 008

g1 value= 1.5120E-02
Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
11/2/98	10:00	10.9			60.0			60.0		122.8				
	11:00	11.1	3600		37.6	Y		37.6	122.8	100.4	8.46E-07	1.223		1.03E-06
	11:00	11.1	0		37.6	N		37.6	100.4	100.4		1.223		
	12:00	11.2	3600		19.1	Y		19.2	100.4	82.0	8.50E-07	1.220		1.04E-06
	12:00	11.2	0		60.0	N		60.0	81.9	122.8		1.220		
	13:00	11.2	3600		34.8	Y		34.8	122.8	97.6	9.65E-07	1.220		1.18E-06
	13:00	11.2	0		34.8	N		34.7	97.6	97.5		1.220		
	14:00	11.2	3600		17.7	Y		17.7	97.6	80.5	8.09E-07	1.220		9.87E-07
	14:00	11.2	0		60.0	N		60.0	80.5	122.8		1.220		
	15:00	11.3	3600		36.2	Y		36.3	122.8	99.1	9.01E-07	1.218		1.10E-06
11/3/98	8:00	8.2	61200		60.0	N		59.1	99.0	121.9		1.294		
	9:00	8.3	3600		36.3	Y		36.4	122.8	99.2	8.96E-07	1.291		1.16E-06
	9:00	8.3	0		36.3	N		36.3	99.1	99.1		1.291		
	10:00	8.6	3600		19.0	Y		19.1	99.1	81.9	8.01E-07	1.284		1.03E-06
	10:00	8.6	0		60.0	N		60.0	81.8	122.8		1.284		
	11:00	8.8	3600		36.8	Y		36.8	122.8	99.6	8.79E-07	1.279		1.12E-06
	11:00	8.8	0		36.8	N		36.8	99.6	99.6		1.279		
	12:00	9.0	3600		20.1	Y		20.3	99.6	83.1	7.61E-07	1.274		9.69E-07
	12:00	9.0	0		60.0	N		60.0	82.9	122.8		1.274		
	13:00	9.3	3600		37.5	Y		37.5	122.8	100.3	8.50E-07	1.267		1.08E-06
	13:00	9.3	0		37.5	N		37.6	100.3	100.4		1.267		
	14:00	9.5	3600		20.9	Y		20.9	100.3	83.7	7.60E-07	1.262		9.59E-07
	14:00	9.5	0		60.0	N		60.0	83.7	122.8		1.262		
	15:00	9.6	3600		20.4	Y		20.4	122.8	83.2	1.64E-06	1.260		2.06E-06
11/4/98	8:00	6.6	61200		60.0	N		58.7	83.2	121.5		1.333		
	9:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	0		60.0	N		60.0	122.8	122.8		1.333		
	11:00	6.7	3600		36.0	Y		36.1	122.8	98.9	9.09E-07	1.331		1.21E-06
	11:00	6.7	0		36.0	N		36.0	98.8	98.8		1.331		
	12:00	6.9	3600		16.7	Y		17.0	98.8	79.8	8.97E-07	1.326		1.19E-06
	12:00	6.9	0		60.0	N		60.0	79.5	122.8		1.326		
	13:00	7.2	3600		37.1	Y		37.3	122.8	100.1	8.58E-07	1.318		1.13E-06
	13:00	7.2	0		37.1	N		37.1	99.9	99.9		1.318		
	14:00	7.5	3600		19.9	Y		20.0	99.9	82.8	7.89E-07	1.311		1.03E-06
	14:00	7.5	0		60.0	N		60.0	82.7	122.8		1.311		
	15:00	7.7	3600		38.5	Y		38.6	122.8	101.4	8.04E-07	1.306		1.05E-06
11/5/98	10:00	5.8	68400		60.0	N		59.0	101.3	121.8		1.353		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II

g1 value= 1.5120E-02

GAUGE 008

Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	11:00	5.8	3600		35.9	Y		35.9	122.8	98.7	9.18E-07	1.353		1.24E-06
	11:00	6.0	0		35.9	N		36.1	98.7	98.9		1.348		
	12:00	6.0	3600		18.3	Y		18.5	98.7	81.3	8.15E-07	1.348		1.10E-06
	12:00	6.3	0		60.0	N		60.0	81.1	122.8		1.340		
	13:00	6.3	3600		37.4	Y		37.5	122.8	100.3	8.50E-07	1.340		1.14E-06
	13:00	6.5	0		37.4	N		37.4	100.2	100.2		1.336		
	14:00	6.5	3600		21.0	Y		21.1	100.2	83.9	7.46E-07	1.336		9.96E-07
	14:30	6.8	1800		13.5	Y		13.6	83.8	76.4	7.77E-07	1.328		1.03E-06
	14:30	6.8	0		60.0	N		60.0	76.3	122.8		1.328		
	15:00	6.9	1800		48.0	Y		48.0	122.8	110.8	8.64E-07	1.326		1.15E-06
	15:30	6.9	1800		36.1	Y		36.1	110.8	98.9	9.54E-07	1.326		1.27E-06
11/6/98	7:30	6.6	57600		60.0	N		59.6	98.9	122.4		1.333		
	8:00	6.6	1800		47.4	Y		47.4	122.8	110.2	9.09E-07	1.333		1.21E-06
	9:00	6.5	3600		27.9	Y		27.9	110.2	90.7	8.18E-07	1.336		1.09E-06
	9:30	6.6	1800		19.7	Y		19.8	90.7	82.6	7.86E-07	1.333		1.05E-06
	10:00	6.6	1800		12.3	Y		12.4	82.5	75.2	7.78E-07	1.333		1.04E-06
	10:00	6.6	0		60.0	N		60.0	75.1	122.8		1.333		
	10:30	6.7	1800		47.7	Y		47.8	122.8	110.6	8.79E-07	1.331		1.17E-06
	11:00	6.8	1800		37.3	Y		37.3	110.5	100.1	8.30E-07	1.328		1.10E-06
	11:30	6.9	1800		28.8	Y		28.9	100.1	91.7	7.36E-07	1.326		9.76E-07
	11:30	6.9	0		28.8	N		28.8	91.6	91.6		1.326		
	12:00	7.1	1800		20.5	Y		20.6	91.6	83.4	7.88E-07	1.321		1.04E-06
	12:30	7.2	1800		13.1	Y		13.2	83.3	76.0	7.70E-07	1.318		1.02E-06
	12:30	7.2	0		60.0	N		60.0	75.9	122.8		1.318		
	13:00	7.4	1800		48.5	Y		48.5	122.8	111.3	8.26E-07	1.313		1.08E-06
	13:00	7.4	0		48.5	N		48.5	111.3	111.3		1.313		
	13:30	7.5	1800		38.1	Y		38.1	111.3	100.9	8.24E-07	1.311		1.08E-06
	14:00	7.6	1800		29.8	Y		29.7	100.9	92.5	7.30E-07	1.309		9.55E-07

BOUTWELL FIELD PERMEABILITY

114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER

STAGE II

GAUGE 009

g1 value= 1.5120E-02

Housing Height = 62.8

Date	Time	Temp	Delta T(sec)	Field Reading		Calculate	Field Corrections		Plus Perm Housing		k	Calc. Temp	Det. Temp	k'
m/d/y		deg C	(sec)	h1	h2	Perm.	h1c	h2c	h1c	h2c	cm/sec	Correct	Correct	cm/sec
11/2/98	10:00	10.9			60.0			60.0		122.8				
	11:00	11.1	3600		48.1	Y		48.1	122.8	110.9	4.28E-07	1.223		5.23E-07
	11:00	11.1	0		48.1	N		48.1	110.9	110.9		1.223		
	12:00	11.2	3600		36.7	Y		36.8	110.9	99.6	4.51E-07	1.220		5.51E-07
	12:00	11.2	0		36.7	N		36.7	99.5	99.5		1.220		
	13:00	11.2	3600		27.1	Y		27.1	99.5	89.9	4.26E-07	1.220		5.20E-07
	13:00	11.2	0		27.1	N		27.0	89.9	89.8		1.220		
	14:00	11.2	3600		17.4	Y		17.4	89.9	80.2	4.80E-07	1.220		5.85E-07
	14:00	11.2	0		17.4	N		17.4	80.2	80.2		1.220		
	15:00	11.3	3600		9.0	Y		9.1	80.2	71.9	4.59E-07	1.218		5.59E-07
11/3/98	8:00	8.2	61200		60.0	N		59.1	71.8	121.9		1.294		
	9:00	8.3	3600		47.1	Y		47.2	122.8	110.0	4.62E-07	1.291		5.97E-07
	9:00	8.3	0		47.1	N		47.1	109.9	109.9		1.291		
	10:00	8.6	3600		36.6	Y		36.7	109.9	99.5	4.18E-07	1.284		5.36E-07
	10:00	8.6	0		36.6	N		36.6	99.4	99.4		1.284		
	11:00	8.8	3600		27.0	Y		27.0	99.4	89.8	4.27E-07	1.279		5.46E-07
	11:00	8.8	0		27.0	N		27.0	89.8	89.8		1.279		
	12:00	9.0	3600		19.1	Y		19.3	89.6	82.1	3.77E-07	1.274		4.80E-07
	12:00	9.0	0		19.1	N		19.1	81.9	81.9		1.274		
	13:00	9.3	3600		11.2	Y		11.2	81.9	74.0	4.26E-07	1.267		5.40E-07
	13:00	9.3	0		11.2	N		11.3	74.0	74.1		1.267		
	14:00	9.5	3600		4.1	Y		4.1	74.0	66.9	4.24E-07	1.262		5.35E-07
	14:00	9.5	0		60.0	N		60.0	66.9	122.8		1.262		
	15:00	9.6	3600		52.5	Y		52.5	122.8	115.3	2.65E-07	1.260		3.33E-07
11/4/98	8:00	6.6	61200		60.0	N		58.7	115.3	121.5		1.333		
	9:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	3600		47.3	Y		47.3	122.8	110.1	4.59E-07	1.333		6.11E-07
	10:00	6.6	0		47.3	N		47.3	110.1	110.1		1.333		
	11:00	6.7	3600		37.2	Y		37.3	110.1	100.1	4.00E-07	1.331		5.32E-07
	11:00	6.7	0		37.2	N		37.2	100.0	100.0		1.331		
	12:00	6.9	3600		27.1	Y		27.4	100.0	90.2	4.33E-07	1.326		5.74E-07
	12:00	6.9	0		27.1	N		27.1	89.9	89.9		1.326		
	13:00	7.2	3600		19.0	Y		19.2	89.9	82.0	3.86E-07	1.318		5.09E-07
	13:00	7.2	0		19.0	N		19.0	81.8	81.8		1.318		
	14:00	7.5	3600		11.4	Y		11.5	81.6	74.3	4.04E-07	1.311		5.30E-07
	14:00	7.5	0		11.4	N		11.4	74.2	74.2		1.311		
	15:00	7.7	3600		4.3	Y		4.4	74.2	67.2	4.16E-07	1.306		5.44E-07
11/5/98	10:00	5.8	68400		60.0	N		59.0	67.1	121.8		1.353		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 009

g1 value= 1.5120E-02
Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	11:00	5.8	3600		47.4	Y		47.4	122.8	110.2	4.55E-07	1.353		6.15E-07
	11:00	6.0	0		47.4	N		47.6	110.2	110.4		1.348		
	12:00	6.0	3600		37.7	Y		37.9	110.2	100.7	3.79E-07	1.348		5.10E-07
	12:00	6.3	0		37.7	N		37.7	100.5	100.5		1.340		
	13:00	6.3	3600		28.8	Y		28.9	100.5	91.7	3.85E-07	1.340		5.16E-07
	13:00	6.5	0		28.8	N		28.8	91.6	91.6		1.336		
	14:00	6.5	3600		21.2	Y		21.3	91.6	84.1	3.59E-07	1.336		4.79E-07
	14:30	6.8	1800		17.3	Y		17.4	84.0	80.2	3.89E-07	1.328		5.16E-07
	14:30	6.8	0		60.0	N		60.0	80.1	122.8		1.328		
	15:00	6.9	1800		53.9	Y		53.9	122.8	116.7	4.28E-07	1.326		5.67E-07
	15:30	6.9	1800		49.7	Y		49.7	116.7	112.5	3.08E-07	1.326		4.08E-07
11/6/98	7:30	6.6	57600		60.0	N		59.6	112.5	122.4		1.333		
	8:00	6.6	1800		53.7	Y		53.7	122.8	116.5	4.42E-07	1.333		5.90E-07
	9:00	6.5	3600		43.2	Y		43.2	116.5	106.0	3.97E-07	1.336		5.30E-07
	9:30	6.6	1800		38.4	Y		38.5	106.0	101.3	3.81E-07	1.333		5.08E-07
	10:00	6.6	1800		33.8	Y		33.9	101.2	96.7	3.82E-07	1.333		5.09E-07
	10:00	6.6	0		33.8	N		33.8	96.6	96.6		1.333		
	10:30	6.7	1800		29.5	Y		29.6	96.6	92.4	3.73E-07	1.331		4.97E-07
	11:00	6.8	1800		25.3	Y		25.3	92.3	88.1	3.91E-07	1.328		5.20E-07
	11:30	6.9	1800		21.5	Y		21.6	88.1	84.4	3.60E-07	1.326		4.78E-07
	11:30	6.9	0		21.5	N		21.5	84.3	84.3		1.326		
	12:00	7.1	1800		17.9	Y		18.0	84.3	80.8	3.56E-07	1.321		4.70E-07
	12:30	7.2	1800		14.0	Y		14.1	80.7	76.9	4.05E-07	1.318		5.34E-07
	12:30	7.2	0		14.0	N		14.0	76.8	76.8		1.318		
	13:00	7.4	1800		10.8	Y		10.8	76.8	73.6	3.58E-07	1.313		4.70E-07
	13:00	7.4	0		10.8	N		10.8	73.6	73.6		1.313		
	13:30	7.5	1800		7.3	Y		7.3	73.6	70.1	4.09E-07	1.311		5.37E-07
	14:00	7.6	1800		4.2	Y		4.3	70.1	67.1	3.67E-07	1.309		4.81E-07

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 010

g1 value= 1.5120E-02

Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
11/2/98	10:00	10.9			60.0			60.0		122.8				
	11:00	11.1	3600		34.8	Y		34.8	122.8	97.6	9.65E-07	1.223		1.18E-06
	11:00	11.1	0		34.8	N		34.8	97.6	97.6		1.223		
	12:00	11.2	3600		15.3	Y		15.4	97.6	78.2	9.31E-07	1.220		1.14E-06
	12:00	11.2	0		60.0	N		60.0	78.1	122.8		1.220		
	13:00	11.2	3600		33.0	Y		33.0	122.8	95.8	1.04E-06	1.220		1.27E-06
	13:00	11.2	0		33.0	N		32.9	95.8	95.7		1.220		
	14:00	11.2	3600		15.1	Y		15.1	95.8	77.9	8.69E-07	1.220		1.06E-06
	14:00	11.2	0		60.0	N		60.0	77.9	122.8		1.220		
	15:00	11.3	3600		35.4	Y		35.5	122.8	98.3	9.35E-07	1.218		1.14E-06
11/3/98	8:00	8.2	61200		60.0	N		59.1	98.2	121.9		1.294		
	9:00	8.3	3600		34.5	Y		34.6	122.8	97.4	9.73E-07	1.291		1.26E-06
	9:00	8.3	0		34.5	N		34.5	97.3	97.3		1.291		
	10:00	8.6	3600		16.9	Y		17.0	97.3	79.8	8.33E-07	1.284		1.07E-06
	10:00	8.6	0		60.0	N		60.0	79.7	122.8		1.284		
	11:00	8.8	3600		36.0	Y		36.0	122.8	98.8	9.13E-07	1.279		1.17E-06
	11:00	8.8	0		36.0	N		36.0	98.8	98.8		1.279		
	12:00	9.0	3600		19.9	Y		20.1	98.8	82.9	7.37E-07	1.274		9.39E-07
	12:00	9.0	0		60.0	N		60.0	82.7	122.8		1.274		
	13:00	9.3	3600		37.4	Y		37.4	122.8	100.2	8.54E-07	1.267		1.08E-06
	13:00	9.3	0		37.4	N		37.5	100.2	100.3		1.267		
	14:00	9.5	3600		20.5	Y		20.5	100.2	83.3	7.76E-07	1.262		9.79E-07
	14:00	9.5	0		60.0	N		60.0	83.3	122.8		1.262		
	15:00	9.6	3600		36.4	Y		36.4	122.8	99.2	8.96E-07	1.260		1.13E-06
11/4/98	8:00	6.6	61200		60.0	N		58.7	99.2	121.5		1.333		
	9:00	6.6	3600		60.0	N		60.0	122.8	122.8		1.333		
	10:00	6.6	3600		34.9	Y		34.9	122.8	97.7	9.60E-07	1.333		1.28E-06
	10:00	6.6	0		34.9	N		34.9	97.7	97.7		1.333		
	11:00	6.7	3600		18.5	Y		18.6	97.7	81.4	7.67E-07	1.331		1.02E-06
	11:00	6.7	0		60.0	N		60.0	81.3	122.8		1.331		
	12:00	6.9	3600		36.2	Y		36.5	122.8	99.3	8.92E-07	1.326		1.18E-06
	12:00	6.9	0		36.2	N		36.2	99.0	99.0		1.326		
	13:00	7.2	3600		20.2	Y		20.4	99.0	83.2	7.30E-07	1.318		9.63E-07
	13:00	7.2	0		60.0	N		60.0	83.0	122.8		1.318		
	14:00	7.5	3600		39.1	Y		39.2	122.8	102.0	7.79E-07	1.311		1.02E-06
	14:00	7.5	0		60.0	N		60.0	101.9	122.8		1.311		
	15:00	7.7	3600		40.2	Y		40.3	122.8	103.1	7.34E-07	1.306		9.59E-07
11/5/98	10:00	5.8	68400		60.0	N		59.0	103.0	121.8		1.353		

BOUTWELL FIELD PERMEABILITY
114409 BP CHEMICAL - LIMA, OHIO - CELL NO. 2 - LINER
STAGE II
GAUGE 010

g1 value= 1.5120E-02

Housing Height = 62.8

Date m/d/y	Time	Temp deg C	Delta T(sec) (sec)	Field Reading h1	Field Reading h2	Calculate Perm.	Field Corrections h1c	Field Corrections h2c	Plus Perm Housing h1c	Plus Perm Housing h2c	k cm/sec	Calc. Temp Correct	Det. Temp Correct	k' cm/sec
	11:00	5.8	3600		35.8	Y		35.8	122.8	98.6	9.22E-07	1.353		1.25E-06
	11:00	6.0	0		35.8	N		36.0	98.6	98.8		1.348		
	12:00	6.0	3600		19.8	Y		19.8	98.6	82.6	7.44E-07	1.348		1.00E-06
	12:00	6.3	0		60.0	N		60.0	82.4	122.8		1.340		
	13:00	6.3	3600		38.6	Y		38.7	122.8	101.5	8.00E-07	1.340		1.07E-06
	13:00	6.5	0		38.6	N		38.6	101.4	101.4		1.336		
	14:00	6.5	3600		23.3	Y		23.4	101.4	86.2	6.82E-07	1.336		9.11E-07
	14:30	6.8	1800		15.9	Y		16.0	86.1	78.8	7.44E-07	1.328		9.88E-07
	14:30	6.8	0		60.0	N		60.0	78.7	122.8		1.328		
	15:00	6.9	1800		48.2	Y		48.2	122.8	111.0	8.49E-07	1.326		1.13E-06
	15:30	6.9	1800		39.1	Y		39.1	111.0	101.9	7.19E-07	1.326		9.53E-07
11/6/98	7:30	6.6	57600		60.0	N		59.6	101.9	122.4		1.333		
	8:00	6.6	1800		47.5	Y		47.5	122.8	110.3	9.02E-07	1.333		1.20E-06
	9:00	6.5	3600		29.4	Y		29.4	110.3	92.2	7.53E-07	1.336		1.01E-06
	9:30	6.6	1800		21.7	Y		21.8	92.2	84.6	7.23E-07	1.333		9.63E-07
	10:00	6.6	1800		13.7	Y		13.8	84.5	76.5	8.24E-07	1.333		1.10E-06
	10:00	6.6	0		60.0	N		60.0	76.5	122.8		1.333		
	10:30	6.7	1800		49.5	Y		49.6	122.8	112.4	7.43E-07	1.331		9.89E-07
	11:00	6.8	1800		40.0	Y		40.0	112.3	102.8	7.42E-07	1.328		9.86E-07
	11:30	6.9	1800		32.0	Y		32.1	102.8	94.9	6.72E-07	1.326		8.90E-07
	11:30	6.9	0		32.0	N		32.0	94.6	94.8		1.326		
	12:00	7.1	1800		24.3	Y		24.4	94.8	87.2	7.02E-07	1.321		9.27E-07
	12:30	7.2	1800		17.2	Y		17.3	87.1	80.1	7.04E-07	1.318		9.28E-07
	12:30	7.2	0		17.2	N		17.2	80.0	80.0		1.318		
	13:00	7.4	1800		11.0	Y		11.0	80.0	73.8	6.78E-07	1.313		8.90E-07
	13:00	7.4	0		60.0	N		60.0	73.8	122.8		1.313		
	13:30	7.5	1800		48.0	Y		48.0	122.8	110.8	8.64E-07	1.311		1.13E-06
	14:00	7.6	1800		39.6	Y		39.7	110.8	102.5	6.54E-07	1.309		8.56E-07

APPENDIX B

BROWN COHESIVE SOIL LABORATORY TEST DATA

BOWSER MORNER

Summary of Laboratory Testing for the Brown Cohesive Soils from Cell 2 North Side Slope

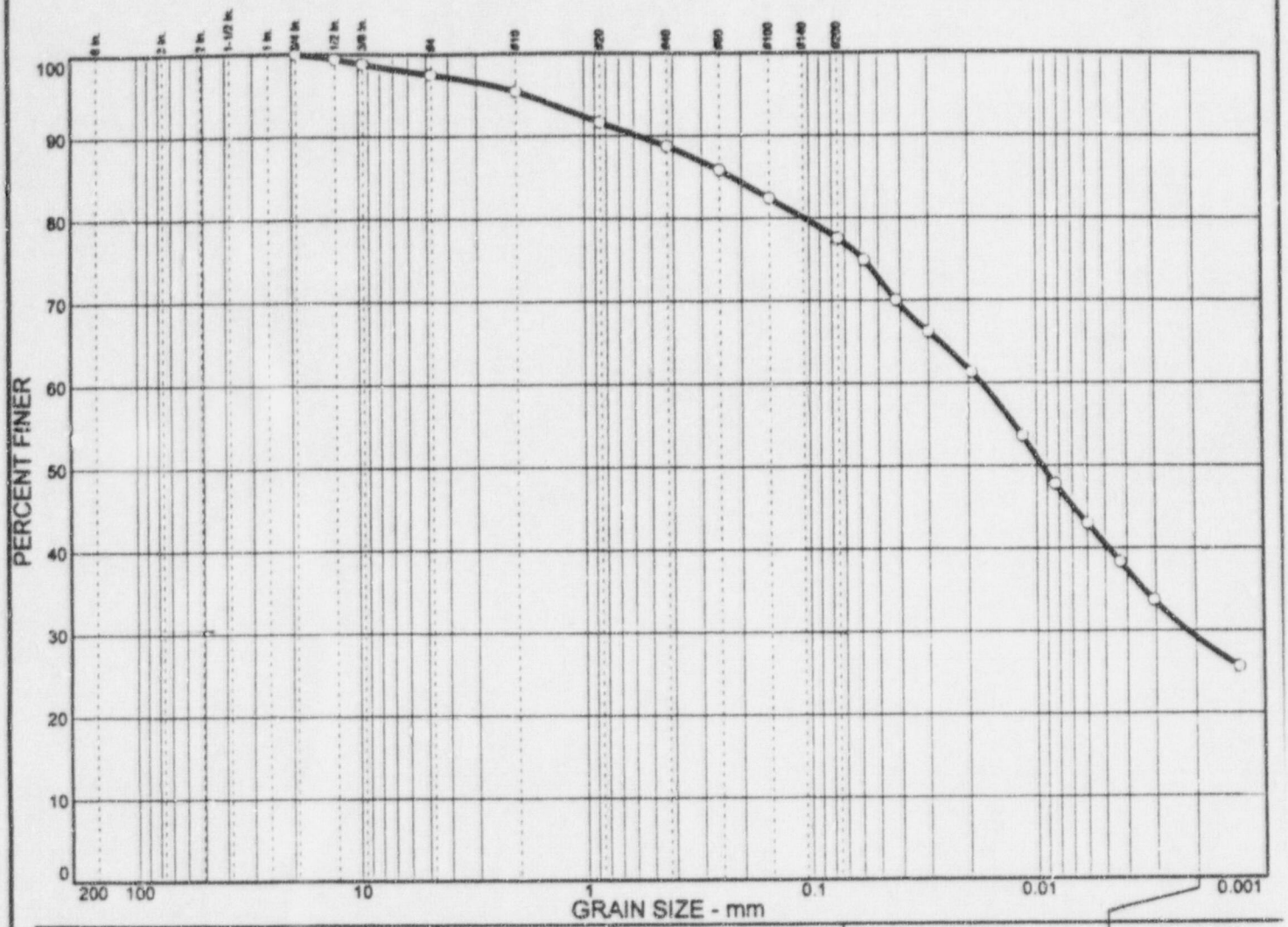
Sample Location	Sample Depth (ft.)	Material Description	USCS Description	Dry Unit Weight (pcf)	Optimum Moisture (%)	Percent > 2 inches (%)	Percent Gravel (%)	Percent Sand (%)	Percent < #200 sieve (%)	Percent Silt (%)	Percent Clay (%)	Liquid Limit (%)	Plasticity Index (%)	Permeability 90%, +2 cm/sec
		Specification Requirement	**CL or CH**	-	-	**0.0**	-	-	**60**	-	-	**> 25**	**10 to 40**	**1.0×10^{-7}**
Grid B-10+ TNW	859-857	brown lean CLAY with sand	CL	125.2	11.0	0.0	2.5	20.0	77.5	48.3	29.2	32	14	3.2E-08
Grid B-11- MNW	851-849	brown lean CLAY with sand	CL	123.9	12.0	0.0	1.9	19.1	79.0	48.7	30.3	33	15	9.6E-08
Grid C-10+ TNW	858-856	brown lean CLAY with sand	CL	122.6	12.8	0.0	2.9	17.8	79.3	43.6	35.7	30	12	8.9E-08
Grid C-11- MNW	851-849	brown lean CLAY with sand	CL	117.8	13.3	0.0	0.4	15.5	84.1	43.2	40.9	45	25	2.5E-08
Grid D-10+ TNW	858-856	brown lean CLAY with sand	CL	123.4	11.5	0.0	2.5	18.9	78.6	46.5	32.1	30	13	1.8E-08
Grid D-11- MNW	852-849	brown lean CLAY with sand	CL	123.2	12.0	0.0	1.5	19.2	79.3	45.8	33.5	34	16	4.7E-08
Grid G-10+ TNW	855-853	brown lean CLAY with sand	CL	124.8	10.9	0.0	2.9	18.5	78.6	46.2	32.4	29	12	2.6E-08
Grid G-11- MNW	851-849	brown lean CLAY with sand	CL	123.4	11.7	0.0	3.4	18.0	78.6	46.1	32.5	32	14	3.6E-08
Grid H-10+ TNW	854-852	brown lean CLAY with sand	CL	124.9	10.8	0.0	2.7	19.4	77.9	45.9	32.0	30	13	3.4E-06
Grid H-11- MNW	851-849	brown lean CLAY with sand	CL	124.8	11.3	0.0	1.9	17.9	80.2	45.2	35.0	31	14	2.5E-08
AVERAGE				**123.4**	**11.7**	**0.0**	**2.3**	**18.4**	**79.3**	**46.0**	**33.4**	**33**	**15**	**4.3E-08**

Percent Gravel = Percent retained on #4 sieve
Percent Sand = Percent passing #4 sieve and retained on #200 sieve
Percent Silt = Percent passing #200 sieve and larger than 0.002 mm
Percent Clay = Percent finer than 0.002 mm

USCS CLASSIFICATIONS

BOWSER MORNER.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	2.5	20.0	48.3	29.2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	32	18	0.221	0.0175	0.0094	0.0022				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid B-10+ TNW, Ele. 859-857

Remarks:

○ Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid B-10+ TNW, Ele. 859-857
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid B-10+ TNW, Ele. 859-857
Description: brown lean CLAY with sand
Liquid Limit: 32 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	1086.40
Tare =	229.90
Dry sample weight =	856.50

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.09 Tare = .00 Sample weight = 50.09
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.50 inch	5.28	99.4
.375 inch	10.32	98.8
# 4	21.49	97.5
# 10	39.32	95.4
# 20	1.99	91.6
# 40	3.50	88.7
# 60	5.05	85.8
# 100	6.83	82.4
# 200	9.40	77.5

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.4
Weight of hydrometer sample: 50.09
Hygroscopic moisture correction:
Moist weight & tare = 51.06
Dry weight & tare = 50.69
Tare = 31.21
Hygroscopic moisture= 1.9 %
Calculated biased weight= 51.53
Automatic temperature correction
Composite correction at 20 deg C = -5.5

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

dydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

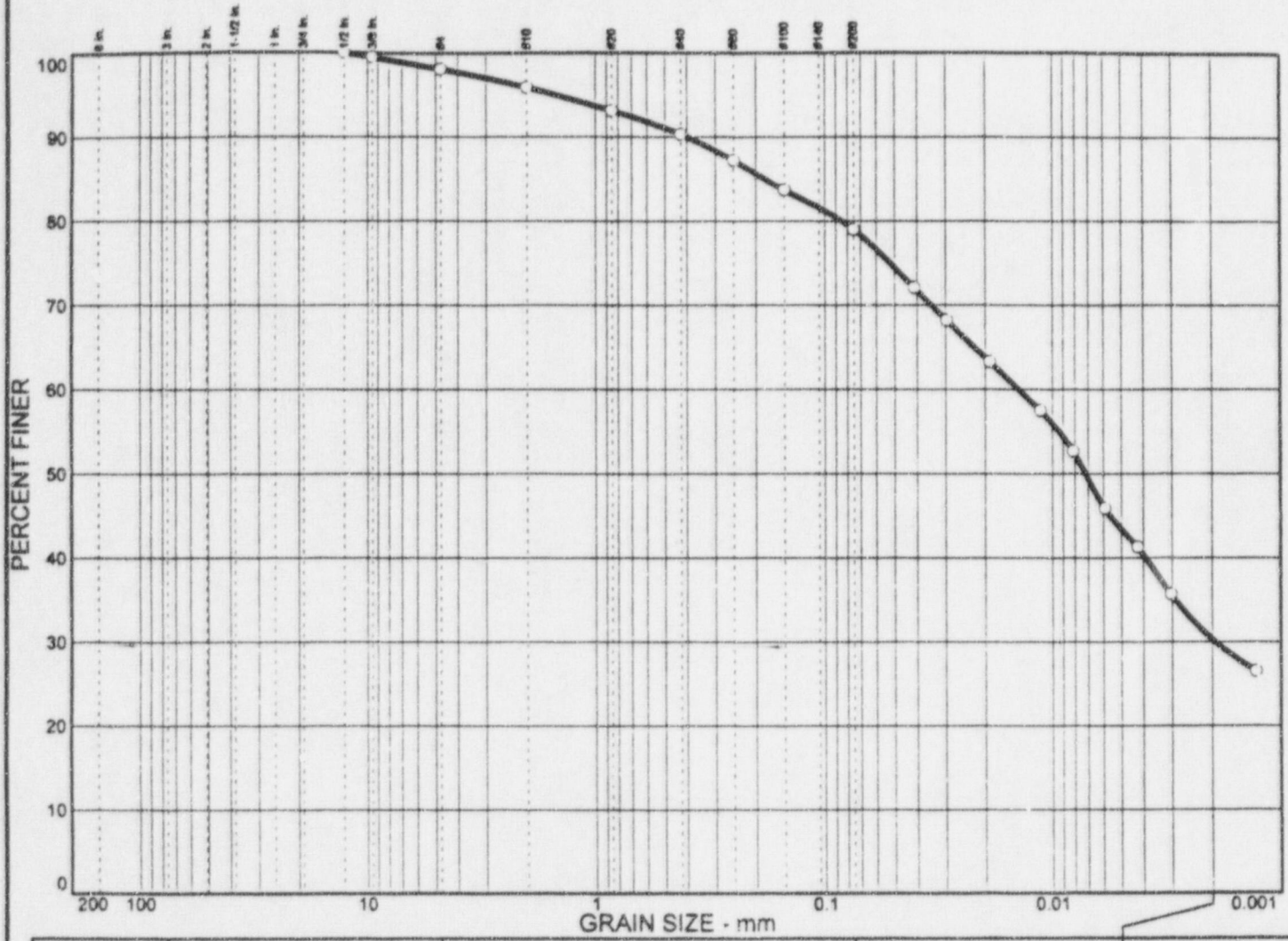
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.6	44.0	38.6	0.0135	44.0	9.1	0.0577	74.9
1.00	20.6	41.5	36.1	0.0135	41.5	9.5	0.0417	70.0
2.00	20.6	39.5	34.1	0.0135	39.5	9.8	0.0300	66.2
5.00	20.6	37.0	31.6	0.0135	37.0	10.2	0.0194	61.3
15.00	20.8	33.0	27.6	0.0135	33.0	10.9	0.0115	53.6
30.00	20.8	30.0	24.6	0.0135	30.0	11.4	0.0083	47.8
60.00	20.8	27.5	22.1	0.0135	27.5	11.8	0.0060	43.0
120.00	21.3	25.0	19.7	0.0134	25.0	12.2	0.0043	38.3
240.00	21.8	22.5	17.4	0.0133	22.5	12.6	0.0031	33.7
1440.00	21.0	18.5	13.2	0.0135	18.5	13.3	0.0013	25.6

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 2.5 % SAND = 20.0
% SILT = 48.3 % CLAY = 29.2

D_{85}= 0.22 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.9	19.1	48.7	30.3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33	18	0.182	0.0141	0.0072	0.0019				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid B-11- MNW, Ele. 851-849

Remarks:

○ Date Received: 7-20-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid B-11- MNW, Ele. 851-849
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid B-11- MNW, Ele. 851-849
Description: brown lean CLAY with sand
Liquid Limit: 33 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-20-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	978.90
Tare =	228.70
Dry sample weight =	750.20

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.34 Tare = .00 Sample weight = 50.34
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.750 inch	0.00	100.0
.375 inch	4.13	99.5
# 4	14.51	98.1
# 10	30.47	95.9
# 20	1.45	93.1
# 40	2.93	90.3
# 60	4.56	87.2
# 100	6.42	83.7
# 200	8.85	79.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.9
Weight of hydrometer sample: 50.34
Hygroscopic moisture correction:
Moist weight & tare = 47.52
Dry weight & tare = 47.13
Tare = 27.96
Hygroscopic moisture= 2.0 %
Calculated biased weight= 51.45
Automatic temperature correction
Composite correction at 20 deg C = -6.0

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H

Effective depth L= 16.294964 - 0.164 x Rm

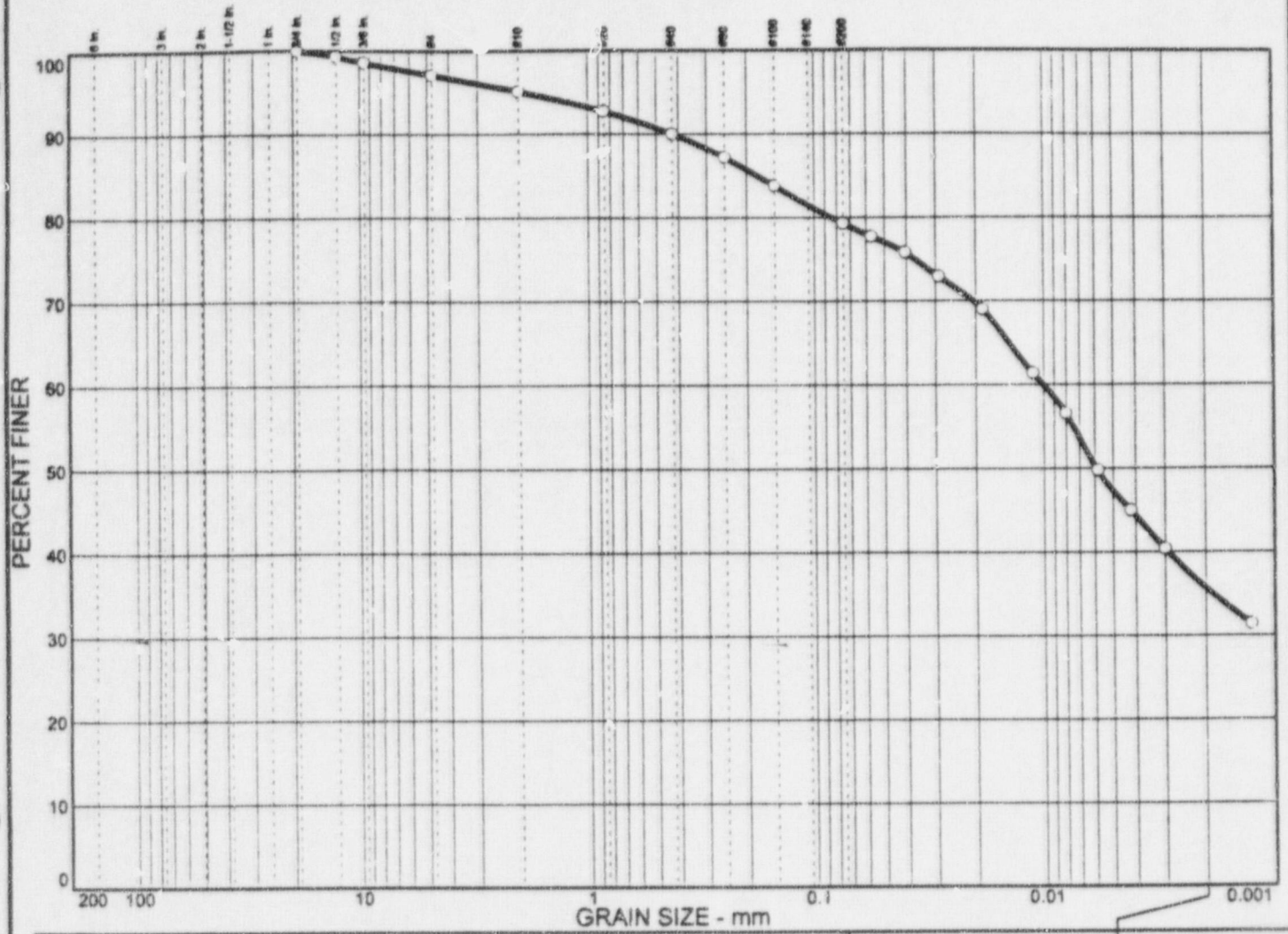
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1.00	20.6	43.0	37.1	0.0135	43.0	9.2	0.0412	72.1
2.00	20.6	41.0	35.1	0.0135	41.0	9.6	0.0296	68.2
5.00	20.6	38.5	32.6	0.0135	38.5	10.0	0.0191	63.3
15.00	20.6	35.5	29.6	0.0135	35.5	10.5	0.0113	57.5
30.00	20.8	33.0	27.1	0.0135	33.0	10.9	0.0081	52.7
60.00	20.8	29.5	23.6	0.0135	29.5	11.5	0.0059	45.9
120.00	21.2	27.0	21.2	0.0134	27.0	11.9	0.0042	41.3
240.00	21.8	24.0	18.4	0.0133	24.0	12.4	0.0030	35.7
1440.00	20.9	19.5	13.7	0.0135	19.5	13.1	0.0013	26.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 1.9 % SAND = 19.1
% SILT = 48.7 % CLAY = 30.3

D_{85}= 0.18 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST DATA



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	2.9	17.8	43.6	35.7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○	30	18	0.179	0.0100	0.0059					

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell 2 - Mixed Waste Closure Project

Location: Grid C-10+ TNW, Ele. 858 - 856

Remarks:

○ Date Received: 07-21-98

GRAIN SIZE DISTRIBUTION TEST DATA

BOWSER-MORNER, INC.

PV

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell 2 - Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemical, Inc.
Sample No.: Grid C-10+ TNW, Ele. 858 - 856
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid C-10+ TNW, Ele. 858 - 856
Description: brown lean CLAY with sand
Liquid Limit: 30 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 07-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	950.80
Tare =	214.20
Dry sample weight =	736.60

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.37 Tare = .00 Sample weight = 50.37
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
[illegible]5 inch	0.00	100.0
[illegible]0 inch	4.94	99.3
.375 inch	10.71	98.6
# 4	21.61	97.1
# 10	36.42	95.1
# 20	1.26	92.7
# 40	2.71	90.0
# 60	4.21	87.2
# 100	6.01	83.8
# 200	8.35	79.3

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.1
Weight of hydrometer sample: 50.37
Hygroscopic moisture correction:
Moist weight & tare = 47.26
Dry weight & tare = 46.86
Tare = 27.68
Hygroscopic moisture= 2.1 %
Calculated biased weight= 51.88
Automatic temperature correction
Composite correction at 20 deg C = -4.5

[illegible]niscus correction only= 0
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

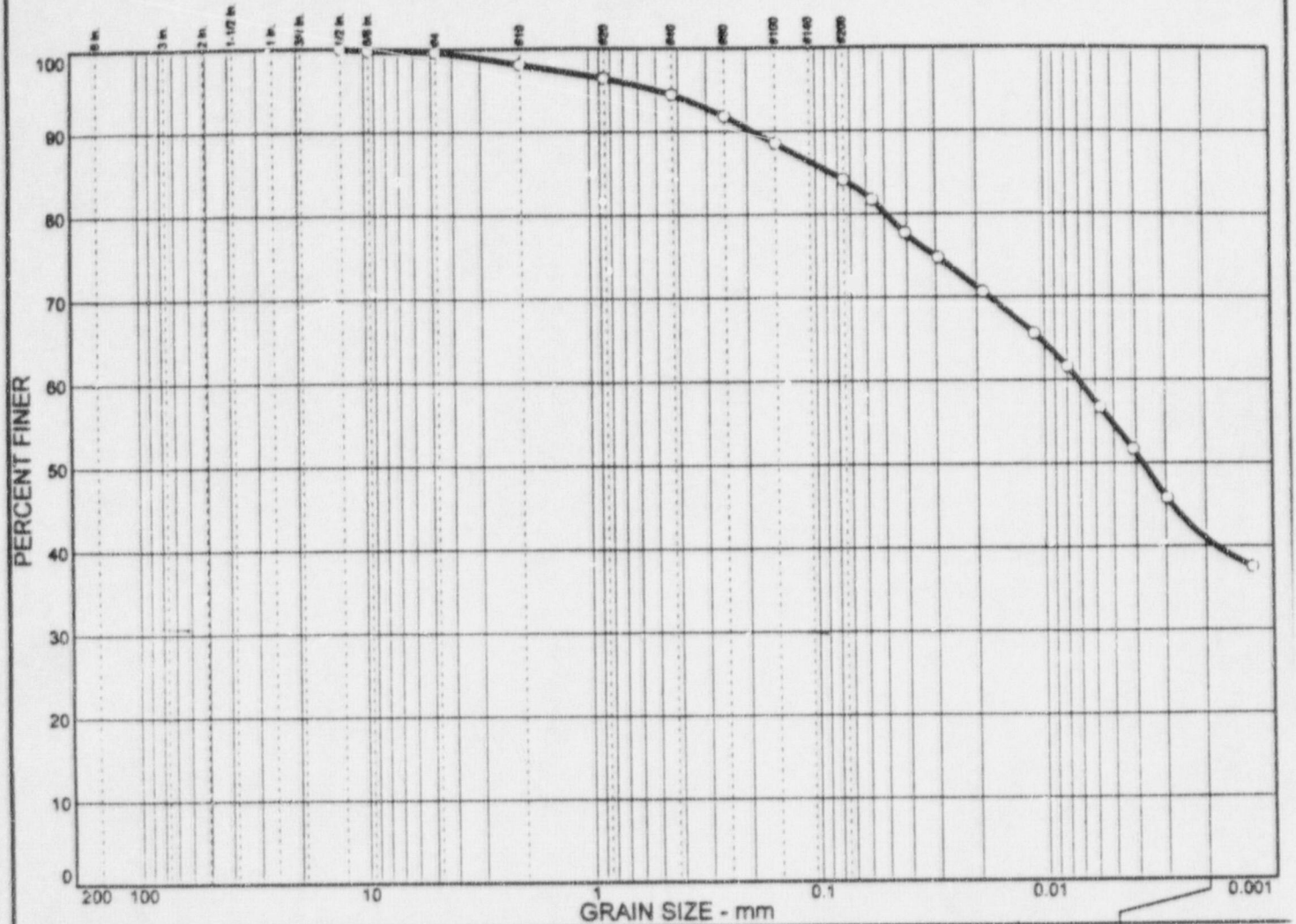
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	21.6	44.5	40.3	0.0134	44.5	9.0	0.0568	77.7
1.00	21.6	43.5	39.3	0.0134	43.5	9.2	0.0405	75.8
2.00	21.6	42.0	37.8	0.0134	42.0	9.4	0.0290	72.9
5.00	21.6	40.0	35.8	0.0134	40.0	9.7	0.0187	69.0
15.00	21.7	36.0	31.8	0.0134	36.0	10.4	0.0111	61.4
30.00	21.7	33.5	29.3	0.0134	33.5	10.8	0.0080	56.6
60.00	21.7	30.0	25.8	0.0134	30.0	11.4	0.0058	49.8
120.00	21.8	27.5	23.4	0.0133	27.5	11.8	0.0042	45.0
240.00	22.1	25.0	20.9	0.0133	25.0	12.2	0.0030	40.4
1440.00	21.4	20.5	16.3	0.0134	20.5	12.9	0.0013	31.4

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 2.9 % SAND = 17.8
% SILT = 43.6 % CLAY = 35.7

D_{85}= 0.18 D_{60}= 0.01 D_{50}= 0.01

GRAIN SIZE DISTRIBUTION TEST DATA



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.4	15.5	43.2	40.9

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	45	20	0.0857	0.0071	0.0037					

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-7-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell 2 - Mixed Waste Closure Project

Location: Grid C-11- MNW, Ele. 851 - 849

Remarks:

○ Date Received: 07-21-98

GRAIN SIZE DISTRIBUTION TEST DATA

BOWSER-MORNER, INC.

PV

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell 2 - Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemical, Inc.
Sample No.: Grid C-11- MNW, Ele. 851 - 849
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid C-11- MNW, Ele. 851 - 849
Description: brown lean CLAY with sand
Liquid Limit: 45 **Plastic Limit:** 20
USCS Classification: CL **AASHTO Classification:** A-7-6
Testing Remarks: Date Received: 07-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	959.50
Tare =	230.10
Dry sample weight =	729.40

Sample split on number 10 **sieve**
Split sample data:
Sample and tare = 50.58 **Tare** = .00 **Sample weight** = 50.58
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.750 inch	0.00	100.0
.375 inch	1.25	99.8
# 4	3.31	99.6
# 10	13.96	98.1
# 20	0.90	96.4
# 40	1.92	94.4
# 60	3.26	91.8
# 100	4.97	88.5
# 200	7.20	84.1

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 98.1
Weight of hydrometer sample: 50.58
Hygroscopic moisture correction:
Moist weight & tare = 48.81
Dry weight & tare = 48.09
Tare = 28.53
Hygroscopic moisture= 3.7 %
Calculated biased weight= 49.73
Automatic temperature correction
Composite correction at 20 deg C = -5.5

Meniscus correction only= 0
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H

Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.8	46.0	40.6	0.0135	46.0	8.8	0.0565	81.7
1.00	20.8	44.0	38.6	0.0135	44.0	9.1	0.0407	77.7
2.00	20.8	42.5	37.1	0.0135	42.5	9.3	0.0292	74.7
5.00	20.8	40.5	35.1	0.0135	40.5	9.7	0.0188	70.6
15.00	20.8	38.0	32.6	0.0135	38.0	10.1	0.0111	65.6
30.00	20.8	36.0	30.6	0.0135	36.0	10.4	0.0080	61.6
60.00	21.1	33.5	28.2	0.0135	33.5	10.8	0.0057	56.7
120.00	21.2	31.0	25.7	0.0134	31.0	11.2	0.0041	51.7
240.00	21.5	28.0	22.8	0.0134	28.0	11.7	0.0030	45.8
1461.00	20.8	24.0	18.6	0.0135	24.0	12.4	0.0012	37.5

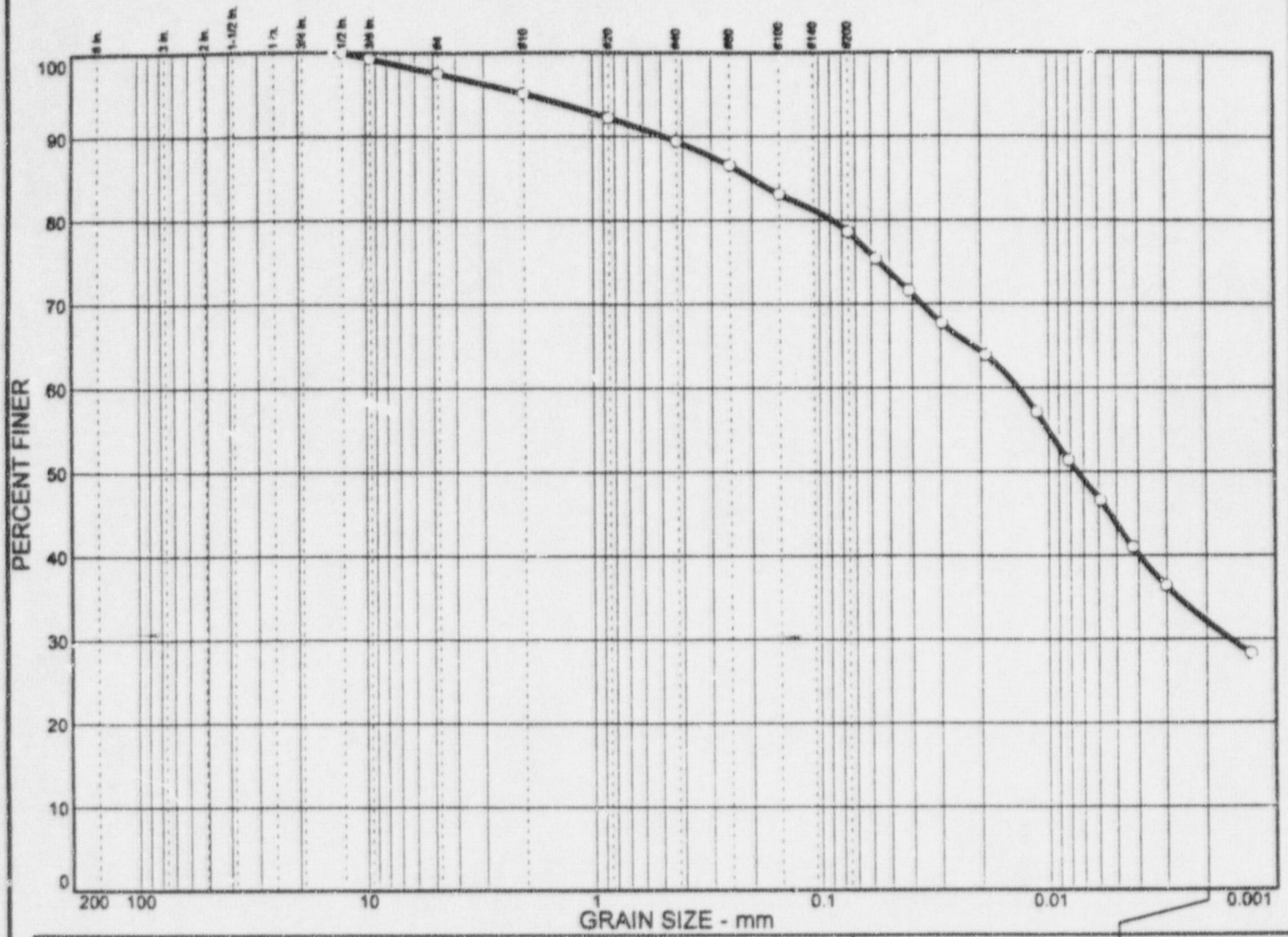
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200

% + 3" = 0.0 % GRAVEL = 0.4 % SAND = 15.5
% SILT = 43.2 % CLAY = 40.9

D_{85}= 0.09 D_{60}= 0.01 D_{50}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	2.5	18.9	46.5	32.1

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○	30	17	0.201	0.0136	0.0074	0.0016				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid D-10+ TNW, Ele. 858-856

Remarks:

○ Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid D-10+ TNW, Ele. 858-856
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid D-10+ TNW, Ele. 858-856
Description: brown lean CLAY with sand
Liquid Limit: 30 **Plastic Limit:** 17
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	965.10
Tare =	227.70
Dry sample weight =	737.40

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.07 Tare = .00 Sample weight = 50.07
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.500 inch	0.00	100.0
.375 inch	5.02	99.3
# 4	18.27	97.5
# 10	36.02	95.1
# 20	1.55	92.2
# 40	3.01	89.4
# 60	4.54	86.5
# 100	6.33	83.1
# 200	8.67	78.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.1
Weight of hydrometer sample: 50.07
Hygroscopic moisture correction:
Moist weight & tare = 48.44
Dry weight & tare = 48.12
Tare = 28.41
Hygroscopic moisture= 1.6 %
Calculated biased weight= 51.81
Automatic temperature correction
Composite correction at 20 deg C = -6.0

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H

Effective depth L= 16.294964 - 0.164 x Rm

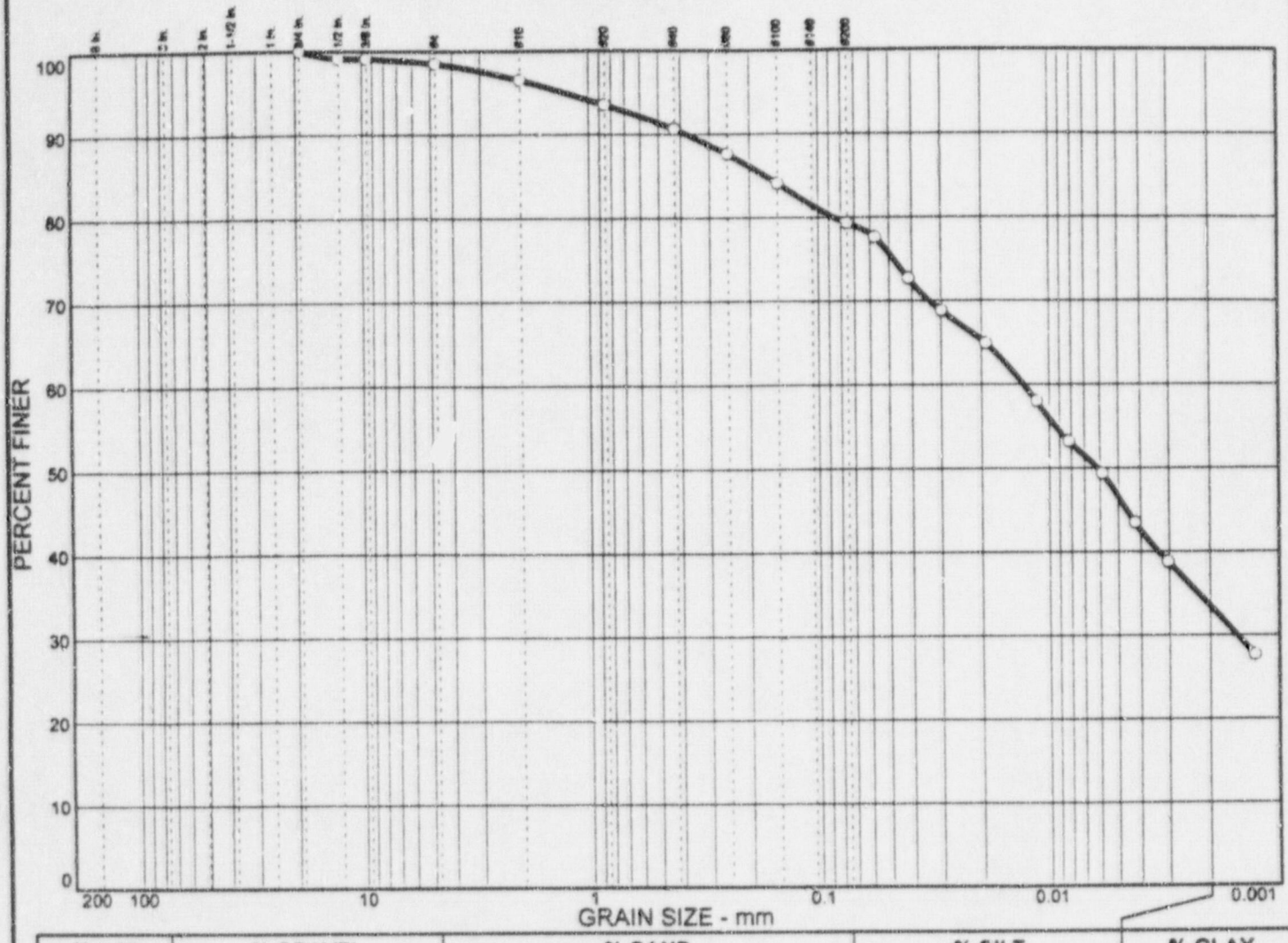
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.6	45.0	39.1	0.0135	45.0	8.9	0.0572	75.4
1.00	20.6	43.0	37.1	0.0135	43.0	9.2	0.0412	71.6
2.00	20.6	41.0	35.1	0.0135	41.0	9.6	0.0296	67.7
5.00	20.6	39.0	33.1	0.0135	39.0	9.9	0.0191	63.9
15.00	20.6	35.5	29.6	0.0135	35.5	10.5	0.0113	57.1
30.00	20.8	32.5	26.6	0.0135	32.5	11.0	0.0082	51.4
60.00	20.8	30.0	24.1	0.0135	30.0	11.4	0.0059	46.6
120.00	21.2	27.0	21.2	0.0134	27.0	11.9	0.0042	41.0
240.00	21.8	24.5	18.9	0.0133	24.5	12.3	0.0030	36.4
1440.00	21.0	20.5	14.7	0.0135	20.5	12.9	0.0013	28.3

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 2.5 % SAND = 18.9
% SILT = 46.5 % CLAY = 32.1

D_{85}= 0.20 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST DATA



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.5	19.2	45.8	33.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	34	18	0.170	0.0130	0.0061	0.0015				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell 2 - Mixed Waste Closure Project

○ **Location:** Grid D-11- MNW, Ele. 852 - 850

Remarks:

○ Date Received: 07-21-98

GRAIN SIZE DISTRIBUTION TEST DATA

BOWSER-MORNER, INC.

PV

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell 2 - Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemical, Inc.
Sample No.: Grid D-11- MNW, Ele. 852 - 850
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid D-11- MNW, Ele. 852 - 850
Description: brown lean CLAY with sand
Liquid Limit: 34 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 07-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	978.80
Tare =	218.00
Dry sample weight =	760.80

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.40 Tare = .00 Sample weight = 50.40
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.50 inch	6.99	99.1
.375 inch	6.99	99.1
# 4	11.33	98.5
# 10	26.85	96.5
# 20	1.56	93.5
# 40	3.10	90.6
# 60	4.66	87.6
# 100	6.46	84.1
# 200	9.00	79.3

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 96.5
Weight of hydrometer sample: 50.40
Hygroscopic moisture correction:
Moist weight & tare = 48.25
Dry weight & tare = 47.81
Tare = 28.74
Hygroscopic moisture= 2.3 %
Calculated biased weight= 51.05
Automatic temperature correction
Composite correction at 20 deg C = -5.0
Meniscus correction only= 0
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

ydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

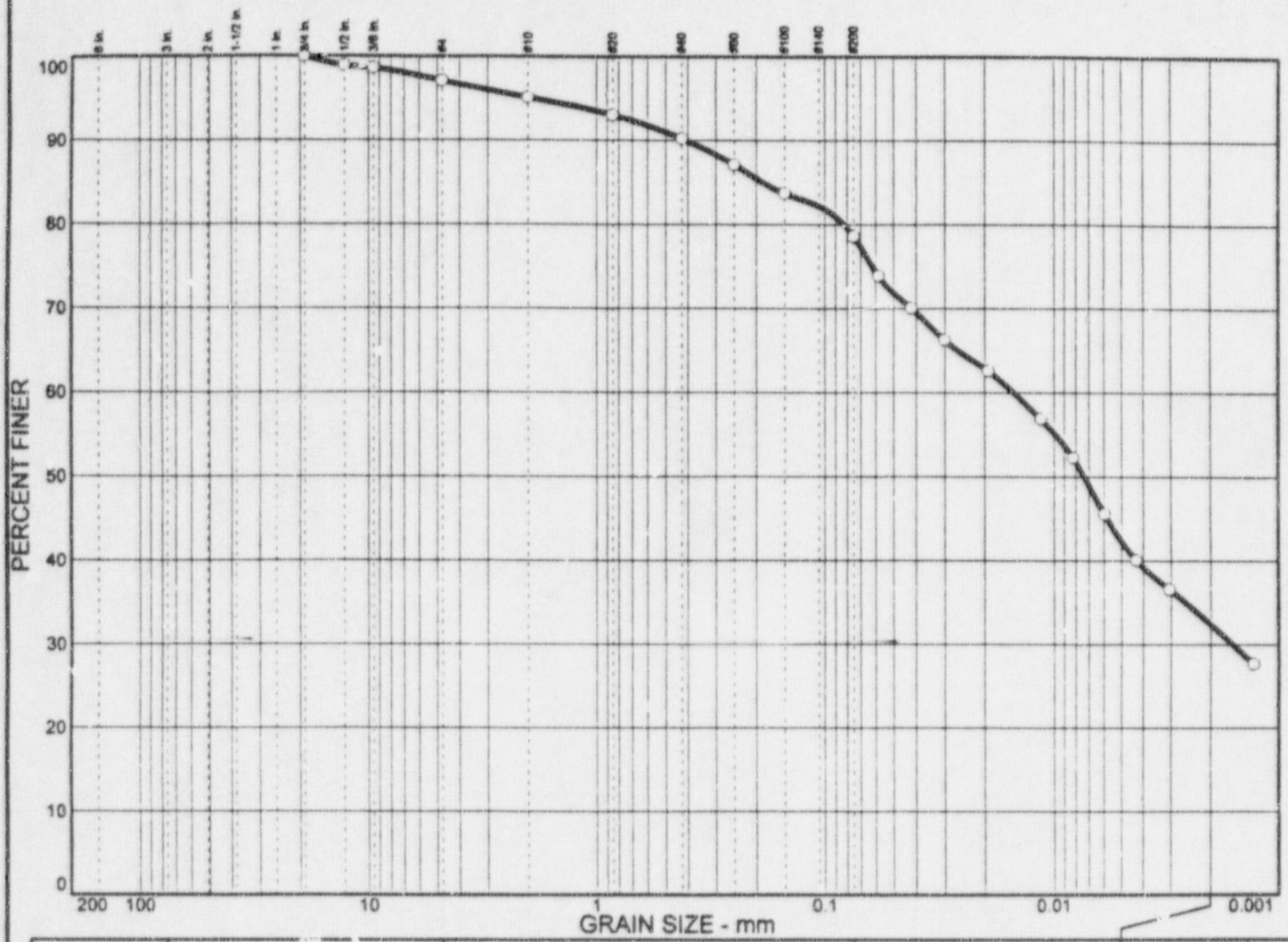
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.8	44.5	39.6	0.0135	44.5	9.0	0.0573	77.6
1.00	20.8	42.0	37.1	0.0135	42.0	9.4	0.0414	72.7
2.00	20.8	40.0	35.1	0.0135	40.0	9.7	0.0298	68.8
5.00	20.8	38.0	33.1	0.0135	38.0	10.1	0.0192	64.9
15.00	20.8	34.5	29.6	0.0135	34.5	10.6	0.0114	58.0
30.00	20.9	32.0	27.2	0.0135	32.0	11.0	0.0082	53.2
60.00	21.1	30.0	25.2	0.0135	30.0	11.4	0.0059	49.4
120.00	21.2	27.0	22.2	0.0134	27.0	11.9	0.0042	43.5
240.00	21.5	24.5	19.8	0.0134	24.5	12.3	0.0030	38.8
1459.00	20.8	19.0	14.1	0.0135	19.0	13.2	0.0013	27.7

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 1.5 % SAND = 19.2
% SILT = 45.8 % CLAY = 33.5

D_{85}= 0.17 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.9	18.5	46.2	32.4

LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
29	17	0.186	0.0149	0.0073	0.0016				

MATERIAL DESCRIPTION	USCS	AASHTO
brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

Location: Grid G-10+ TNW, Ele. 855-853

Remarks:

Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid G-10+ TNW, Ele. 855-853
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid G-10+ TNW, Ele. 855-853
Description: brown lean CLAY with sand
Liquid Limit: 29 **Plastic Limit:** 17
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	994.50
Tare =	214.80
Dry sample weight =	779.70

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.88 Tare = .00 Sample weight = 50.88
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.50 inch	8.35	98.9
.375 inch	11.32	98.6
# 4	22.55	97.1
# 10	38.60	95.1
# 20	1.14	93.0
# 40	2.62	90.2
# 60	4.26	87.1
# 100	6.11	83.7
# 200	8.83	78.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.1
Weight of hydrometer sample: 50.88
Hygroscopic moisture correction:
Moist weight & tare = 48.92
Dry weight & tare = 48.68
Tare = 28.24
Hygroscopic moisture= 1.2 %
Calculated biased weight= 52.88
Automatic temperature correction
Composite correction at 20 deg C = -4.0

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

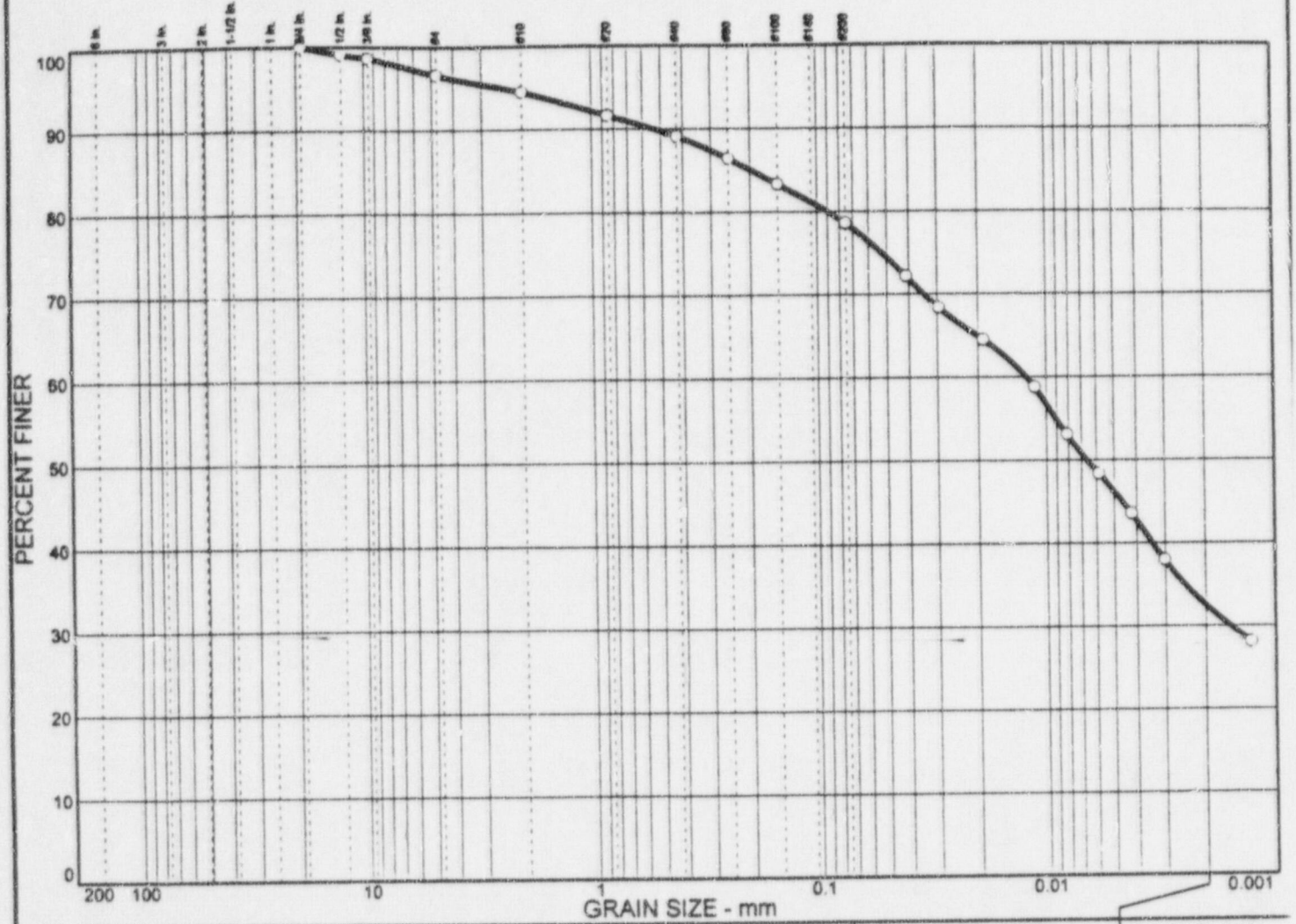
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.5	43.0	39.1	0.0136	43.0	9.2	0.0583	73.9
1.00	20.5	41.0	37.1	0.0136	41.0	9.6	0.0420	70.1
2.00	20.5	39.0	35.1	0.0136	39.0	9.9	0.0302	66.3
5.00	20.6	37.0	33.1	0.0135	37.0	10.2	0.0194	62.6
15.00	20.6	34.0	30.1	0.0135	34.0	10.7	0.0114	56.9
30.00	20.8	31.5	27.6	0.0135	31.5	11.1	0.0082	52.3
60.00	20.8	28.0	24.1	0.0135	28.0	11.7	0.0060	45.6
120.00	21.2	25.0	21.2	0.0134	25.0	12.2	0.0043	40.1
240.00	21.8	23.0	19.4	0.0133	23.0	12.5	0.0030	36.6
1440.00	20.9	18.5	14.7	0.0135	18.5	13.3	0.0013	27.7

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 2.9 % SAND = 18.5
% SILT = 46.2 % CLAY = 32.4

D_{85}= 0.19 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	3.4	18.0	46.1	32.5

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○	32	18	0.198	0.0122	0.0066	0.0016				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid G-11- MNW, Ele. 851-849

Remarks:

○ Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid G-11- MNW, Ele. 851-849
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid G-11- MNW, Ele. 851-849
Description: brown lean CLAY with sand
Liquid Limit: 32 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	941.10
Tare =	240.20
Dry sample weight =	700.90

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.03 Tare = .00 Sample weight = 50.03
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.50 inch	6.41	99.1
.375 inch	9.58	98.6
# 4	23.92	96.6
# 10	38.36	94.5
# 20	1.53	91.6
# 40	2.86	89.1
# 60	4.27	86.4
# 100	5.94	83.3
# 200	8.40	78.6

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 94.5
Weight of hydrometer sample: 50.03
Hygroscopic moisture correction:
Moist weight & tare = 48.08
Dry weight & tare = 47.77
Tare = 28.22
Hygroscopic moisture= 1.6 %
Calculated biased weight= 52.12
Automatic temperature correction
Composite correction at 20 deg C = -5.5

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

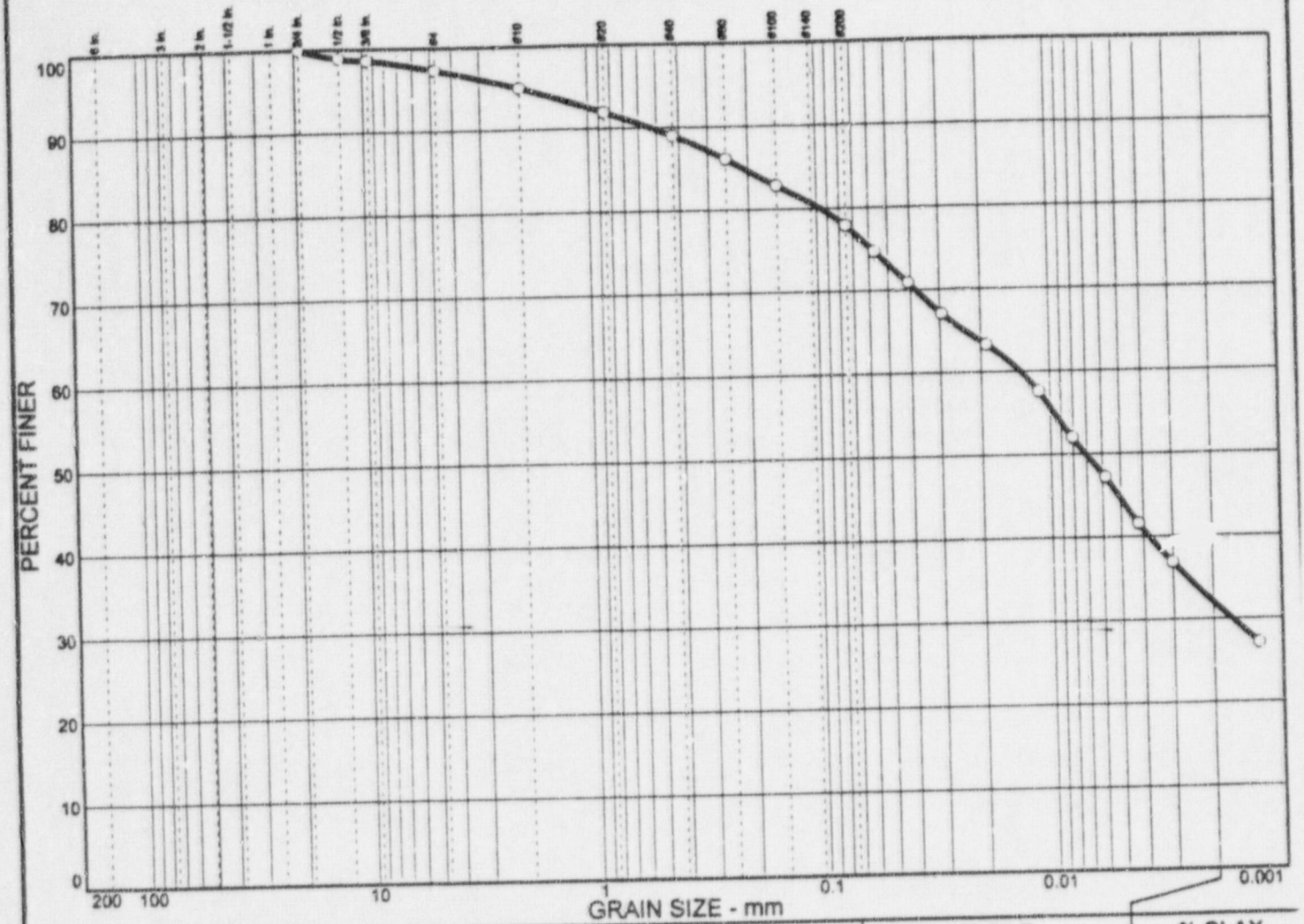
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
1.00	20.8	43.0	37.6	0.0135	43.0	9.2	0.0411	72.2
2.00	20.8	41.0	35.6	0.0135	41.0	9.6	0.0296	68.4
5.00	20.8	39.0	33.6	0.0135	39.0	9.9	0.0190	64.5
15.00	20.8	36.0	30.6	0.0135	36.0	10.4	0.0112	58.8
30.00	20.9	33.0	27.7	0.0135	33.0	10.9	0.0081	53.1
60.00	21.1	30.5	25.2	0.0135	30.5	11.3	0.0058	48.4
120.00	21.2	28.0	22.7	0.0134	28.0	11.7	0.0042	43.6
240.00	21.5	25.0	19.8	0.0134	25.0	12.2	0.0030	38.0
1451.00	20.8	20.0	14.6	0.0135	20.0	13.0	0.0013	28.1

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 3.4 % SAND = 18.0
% SILT = 46.1 % CLAY = 32.5

D_{85}= 0.20 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	2.7	19.4	45.9	32.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
○	30	17	0.211	0.0133	0.0071	0.0017				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid H-10+ TNW, Ele. 854-852

Remarks:

○ Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE D..TRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid H-10+ TNW, Ele. 854-852
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid H-10+ TNW, Ele. 854-852
Description: brown lean CLAY with sand
Liquid Limit: 30 **Plastic Limit:** 17
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	966.10
Tare =	232.10
Dry sample weight =	734.00

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.53 Tare = .00 Sample weight = 50.53
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.75 inch	0.00	100.0
.50 inch	8.36	98.9
.375 inch	10.13	98.6
# 4	20.08	97.3
# 10	37.10	95.0
# 20	1.67	91.9
# 40	3.20	89.0
# 60	4.73	86.1
# 100	6.51	82.8
# 200	9.11	77.9

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 95.0
Weight of hydrometer sample: 50.53
Hygroscopic moisture correction:
Moist weight & tare = 49.34
Dry weight & tare = 49.12
Tare = 29.50
Hygroscopic moisture= 1.1 %
Calculated biased weight= 52.60
Automatic temperature correction
Composite correction at 20 deg C = -5.5

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000

.ydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

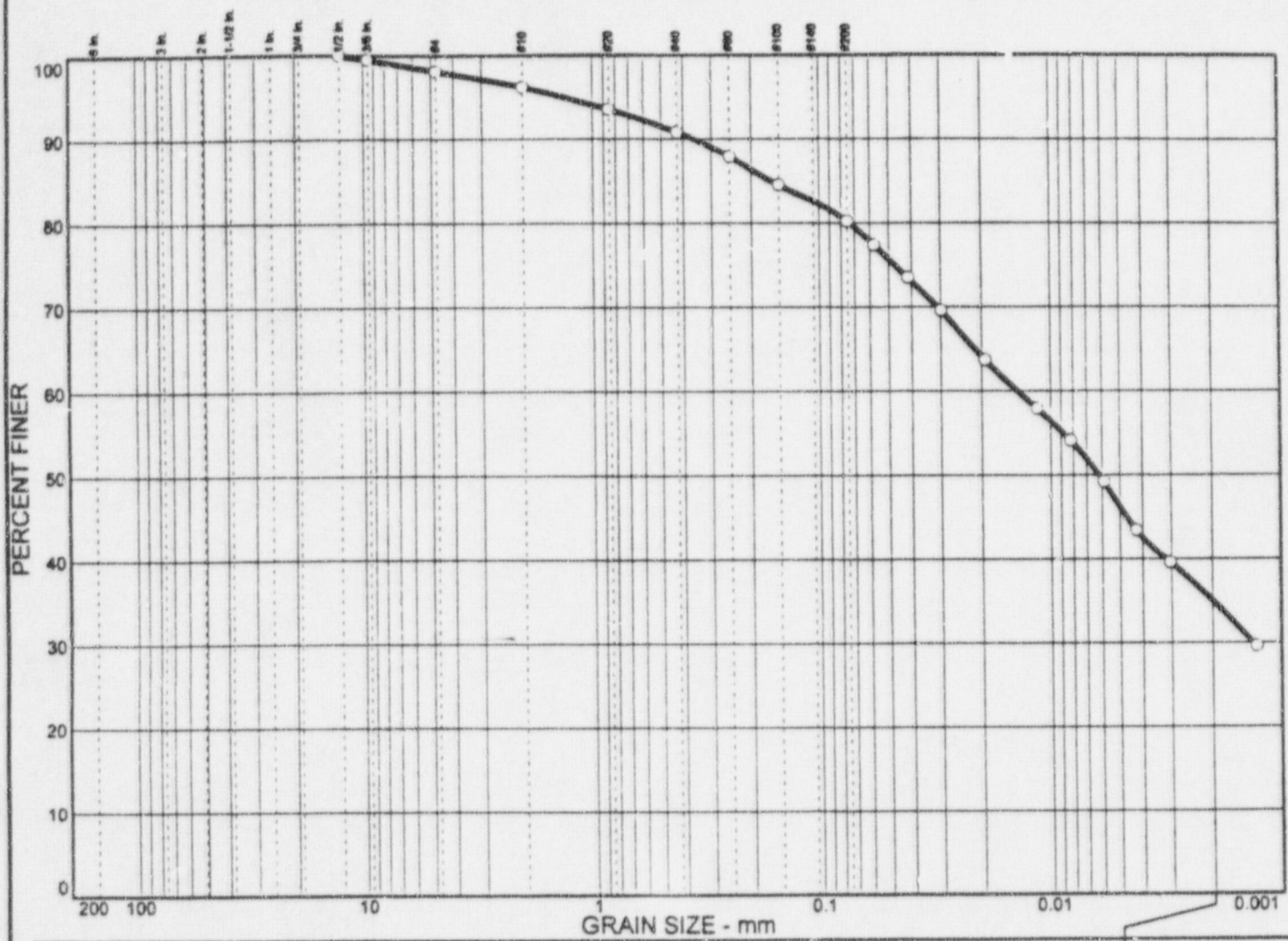
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	21.6	44.5	39.3	0.0134	44.5	9.0	0.0568	74.7
1.00	21.6	42.5	37.3	0.0134	42.5	9.3	0.0409	70.9
2.00	21.6	40.5	35.3	0.0134	40.5	9.7	0.0294	67.1
5.00	21.6	38.5	33.3	0.0134	38.5	10.0	0.0189	63.3
15.00	21.6	35.5	30.3	0.0134	35.5	10.5	0.0112	57.6
30.00	21.7	32.5	27.3	0.0134	32.5	11.0	0.0081	52.0
60.00	21.7	30.0	24.8	0.0134	30.0	11.4	0.0058	47.2
120.00	21.8	27.0	21.9	0.0133	27.0	11.9	0.0042	41.6
240.00	22.1	24.5	19.4	0.0133	24.5	12.3	0.0030	36.9
1440.00	21.4	19.5	14.3	0.0134	19.5	13.1	0.0013	27.1

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 2.7 % SAND = 19.4
% SILT = 45.9 % CLAY = 32.0

D_{85}= 0.21 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.9	17.9	45.2	35.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	31	17	0.163	0.0140	0.0062	0.0013				

MATERIAL DESCRIPTION	USCS	AASHTO
○ brown lean CLAY with sand	CL	A-6

Project No. 114409 **Client:** BP Chemicals, Inc.

Project: Cell-2, Mixed Waste Closure Project

○ **Location:** Grid H-11- MNW, Ele. 851-849

Remarks:

○ Date Received: 7-21-98

GRAIN SIZE DISTRIBUTION TEST REPORT

BOWSER-MORNER, INC.

KP

GRAIN SIZE DISTRIBUTION TEST DATA

Client: BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Project Number: 114409

Sample Data

Source: 114409 BP Chemicals, Inc.
Sample No.: Grid H-11- MNW, Ele. 851-849
Elev. or Depth: **Sample Length (in./cm.):**
Location: Grid H-11- MNW, Ele. 851-849
Description: brown lean CLAY with sand
Liquid Limit: 31 **Plastic Limit:** 17
USCS Classification: CL **AASHTO Classification:** A-6
Testing Remarks: Date Received: 7-21-98

Mechanical Analysis Data

	Initial
Dry sample and tare=	990.00
Tare =	228.30
Dry sample weight =	761.70

Sample split on number 10 sieve
Split sample data:
Sample and tare = 50.27 Tare = .00 Sample weight = 50.27
Cumulative weight retained tare= .00
Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.750 inch	0.00	100.0
.375 inch	4.14	99.5
# 4	14.76	98.1
# 10	29.33	96.2
# 20	1.41	93.5
# 40	2.85	90.8
# 60	4.36	87.9
# 100	6.13	84.5
# 200	8.34	80.2

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 96.2
Weight of hydrometer sample: 50.27
Hygroscopic moisture correction:
Moist weight & tare = 50.79
Dry weight & tare = 50.37
Tare = 30.01
Hygroscopic moisture= 2.1 %
Calculated biased weight= 51.20
Automatic temperature correction
Composite correction at 20 deg C = -4.5

Meniscus correction only= 0.00
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H

Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
0.50	20.8	44.0	39.6	0.0135	44.0	9.1	0.0576	77.4
1.00	20.8	42.0	37.6	0.0135	42.0	9.4	0.0414	73.5
2.00	20.8	40.0	35.6	0.0135	40.0	9.7	0.0298	69.6
5.00	20.8	37.0	32.6	0.0135	37.0	10.2	0.0193	63.7
15.00	20.8	34.0	29.6	0.0135	34.0	10.7	0.0114	57.9
30.00	21.0	32.0	27.7	0.0135	32.0	11.0	0.0082	54.1
60.00	21.1	29.5	25.2	0.0135	29.5	11.5	0.0059	49.2
120.00	21.2	26.5	22.2	0.0134	26.5	11.9	0.0042	43.4
240.00	21.5	24.5	20.3	0.0134	24.5	12.3	0.0030	39.6
1449.00	20.8	19.5	15.1	0.0135	19.5	13.1	0.0013	29.6

Fractional Components

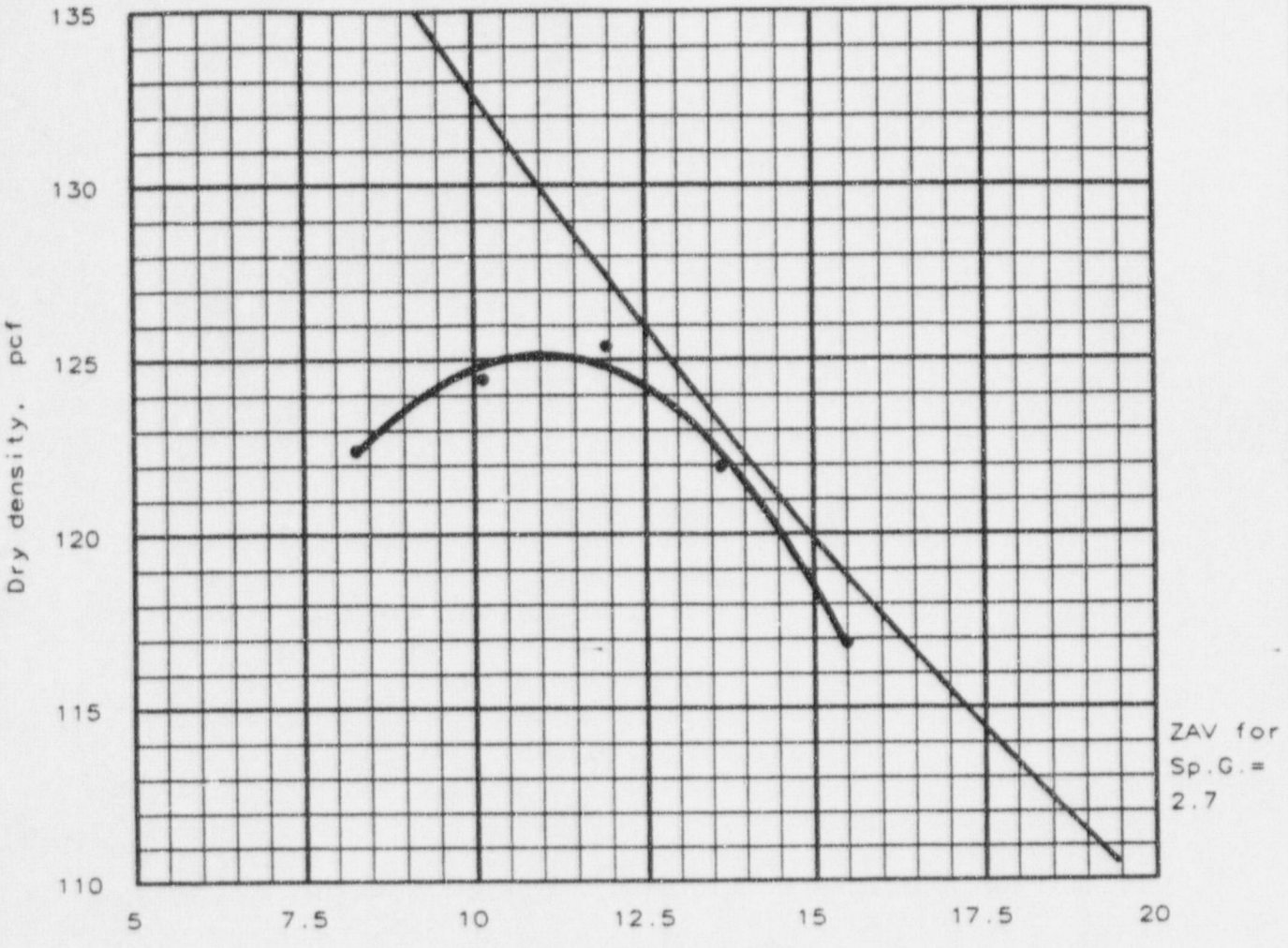
Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 1.9 % SAND = 17.9
% SILT = 45.2 % CLAY = 35.0

D_{85}= 0.16 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

MOISTURE DENSITY RELATIONSHIPS

BOWSER MORNER.

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			32	14	2.5 %	77.5 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 125.2 pcf Optimum moisture = 11.0 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc

Project: Cell-2, Mixed Waste Closure Project

Location: Grid B-10+ TNW, Ele. 859 - 857

Date: 07-28-98

Remarks:

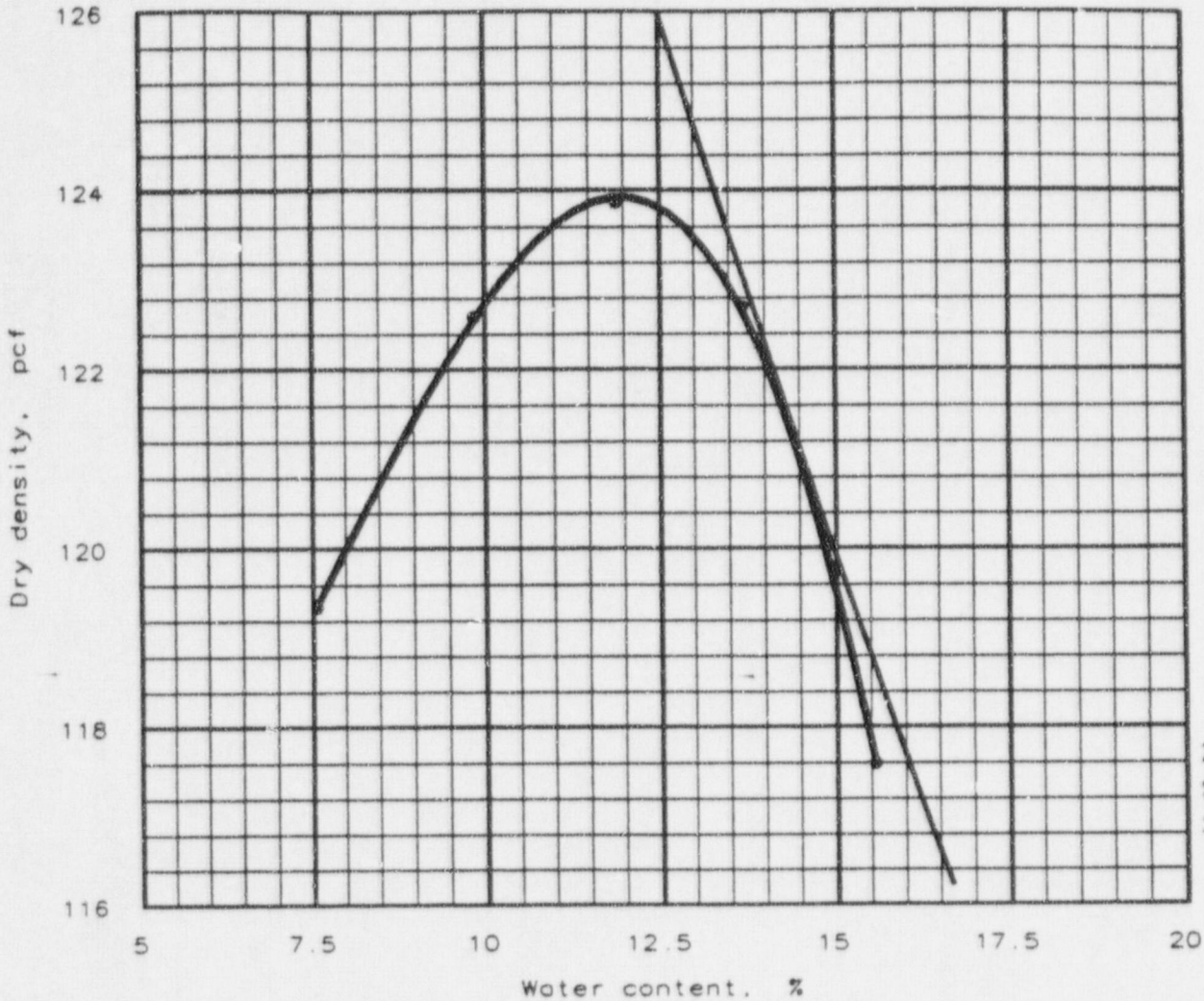
Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. PV400

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			33	15	1.9 %	79.0 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.9 pcf Optimum moisture = 12.0 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Location: Grid B-11- MNW, Ele. 851-849

Date: 7-27-1998

Remarks:

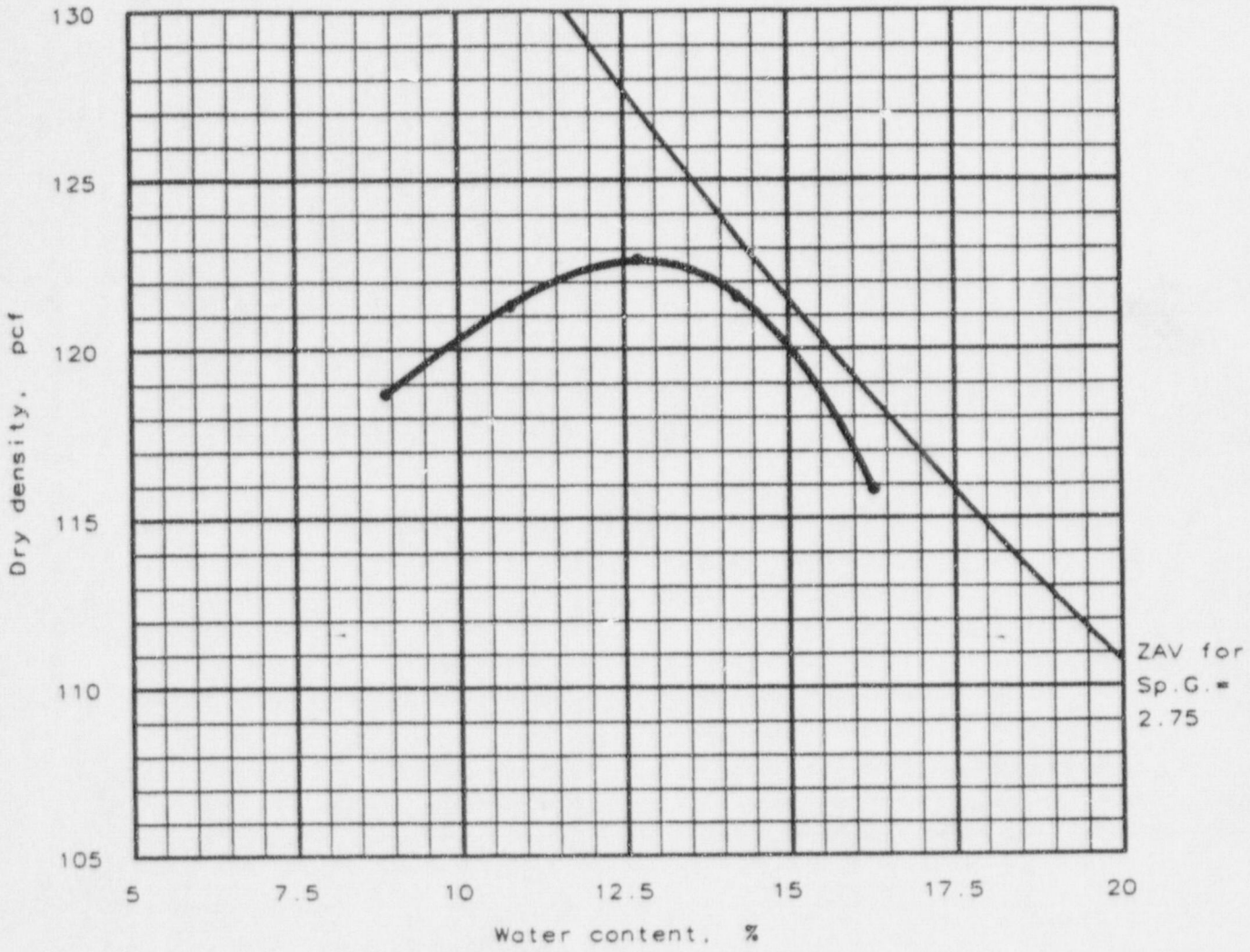
Date Received: 07-20-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. GS-368

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			30	12	2.9 %	79.3 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 122.6 pcf Optimum moisture = 12.8 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Location: Grid C-10+ TNW, Ele. 858-856

Date: 7-30-1998

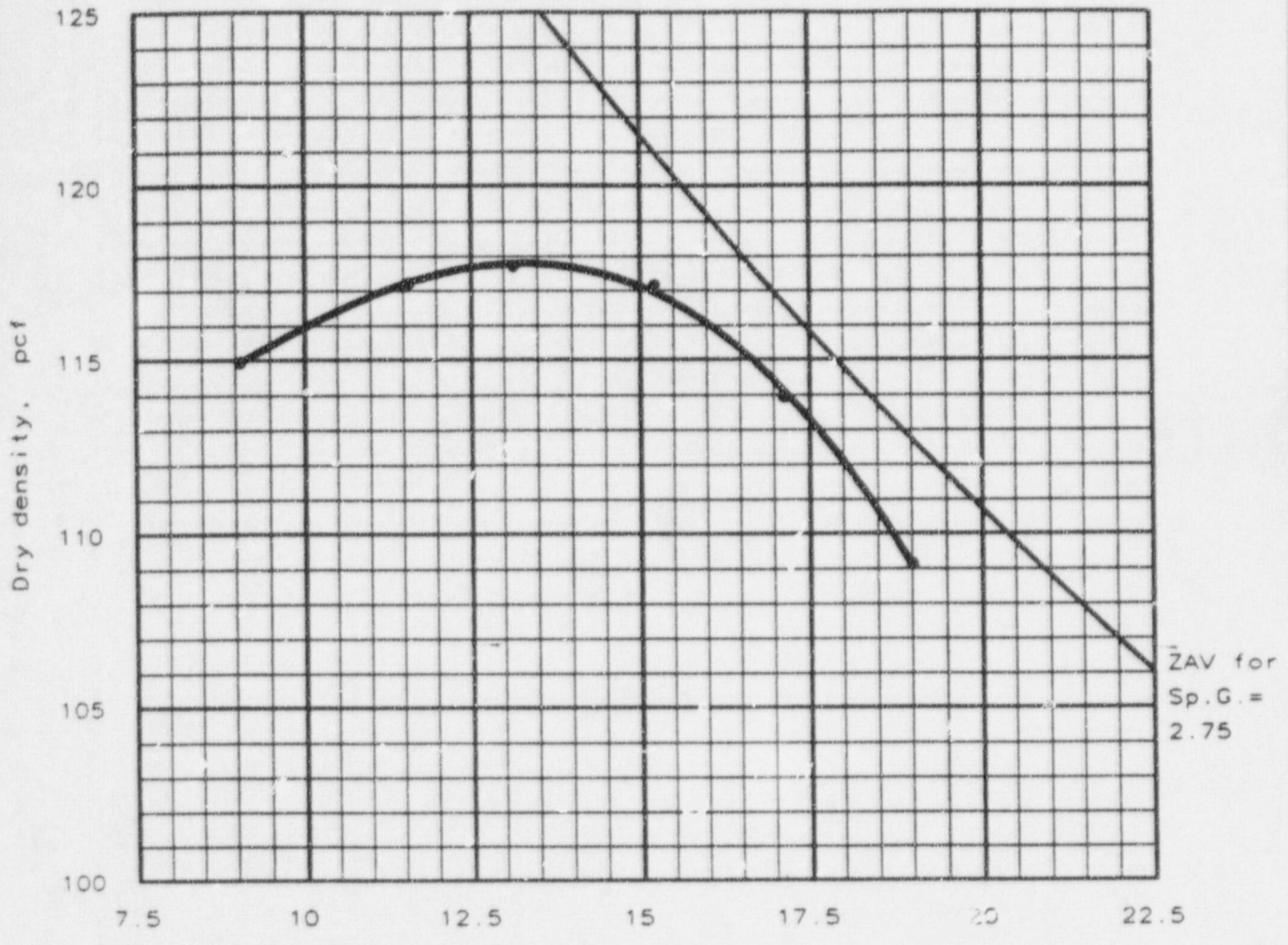
Remarks:
Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. GS-377

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-7-6			45	25	0.4 %	84.1 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.8 pcf Optimum moisture = 13.3 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Location: Grid C-11- MNW, Ele. 851-849

Date: 7-30-1998

Remarks:

Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. GS-371

PROCTOR TEST REPORT

Test specification: ASTM D 1557-91 Method A, Modified

Elev / Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	CL	A-6			30	13	2.5 %	78.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.4 pcf Optimum moisture = 11.5 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc.
Project: Cell-2, Mixed Waste Closure Project
Location: Grid D-10+ TNW, Ele. 858-856

Date: 7-30-1998

Remarks:

Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. GS-370

PROCTOR TEST REPORT

Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			34	16	1.5 %	79.3 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.2 pcf Optimum moisture = 12.0 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc
Project: Cell-2, Mixed Waste Closure Project
Location: Grid D-11- MNW, Ele. 852 - 850

Date: 07-23-98

Remarks:

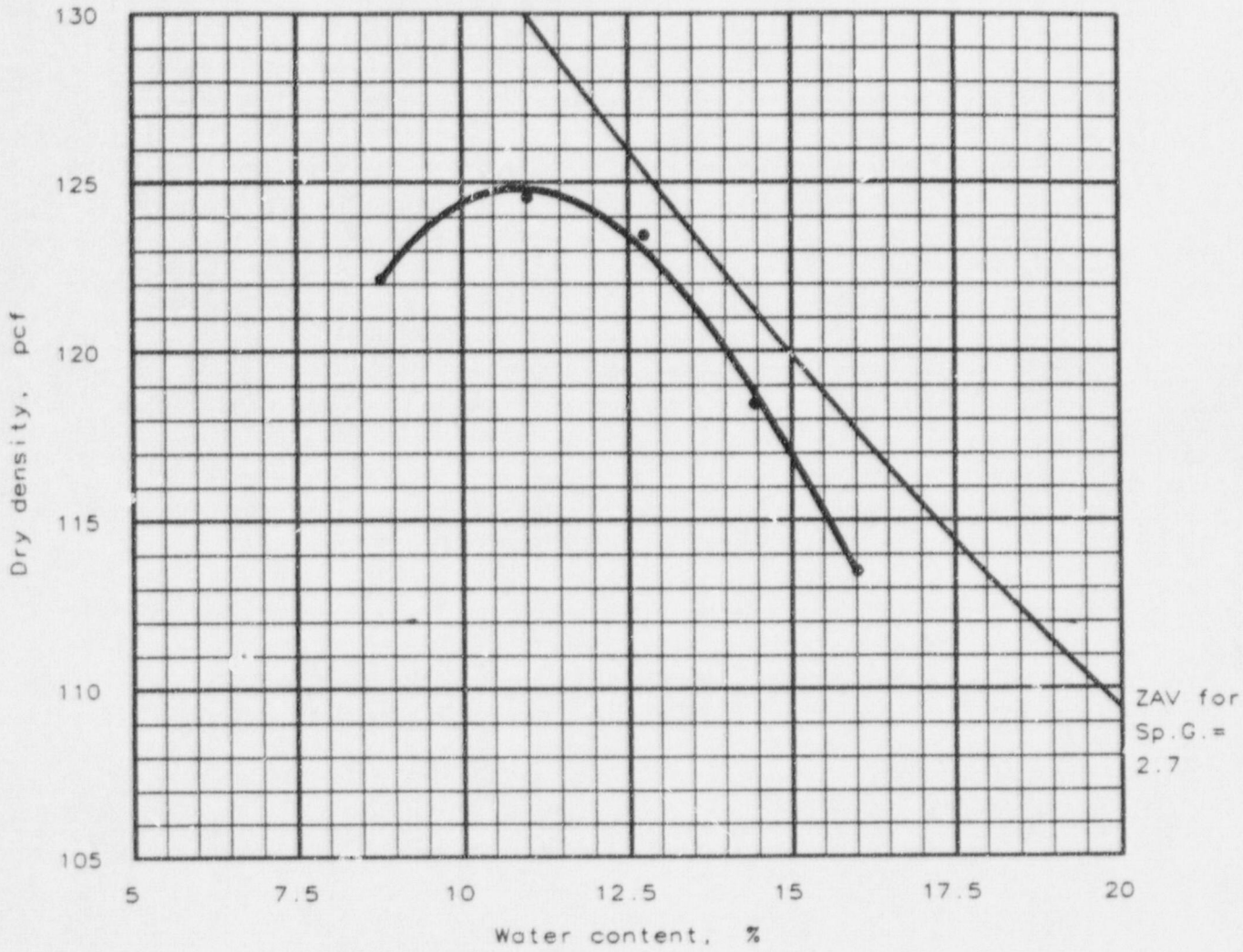
Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. PV398

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			29	12	2.9 %	78.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.8 pcf Optimum moisture = 10.9 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc
Project: Cell-2, Mixed Waste Closure Project
Location: Grid G-10+ TNW, Ele. 855-853

Date: 07-28-98

Remarks:

Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. KP402

PROCTOR TEST REPORT

Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			32	14	3.4 %	78.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.4 pcf Optimum moisture = 11.7 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc
Project: Cell-2, Mixed Waste Closure Project
Location: Grid G-11- MNW, Ele. 851 - 849

Date: 07-28-98

Remarks:

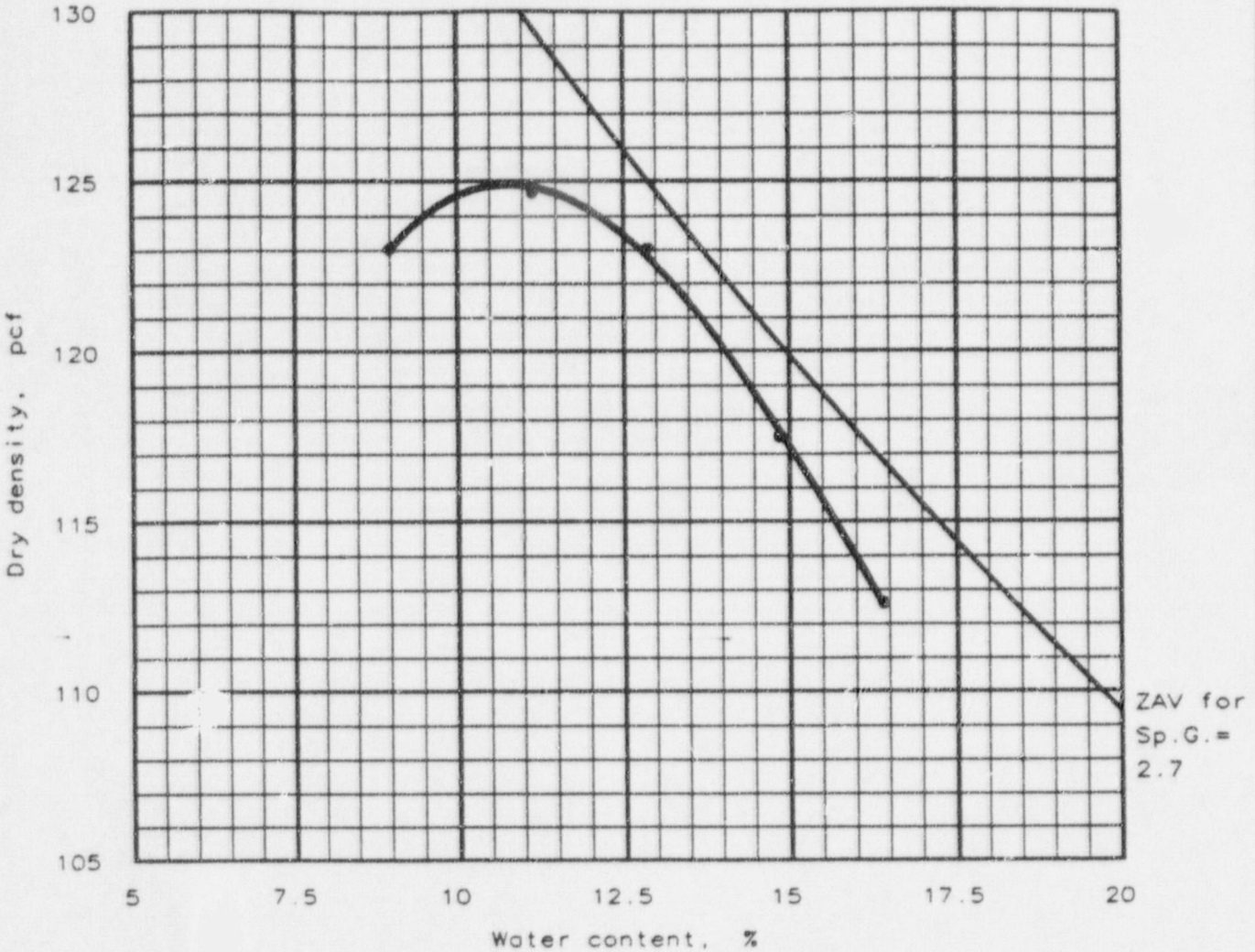
Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. PV401

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			30	13	2.7 %	77.9 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.9 pcf Optimum moisture = 10.8 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, I.c

Project: Cell-2, Mixed Waste Closure Project

Location: Grid H-10+ TNW, Ele. 854-852

Date: 07-28-98

Remarks:

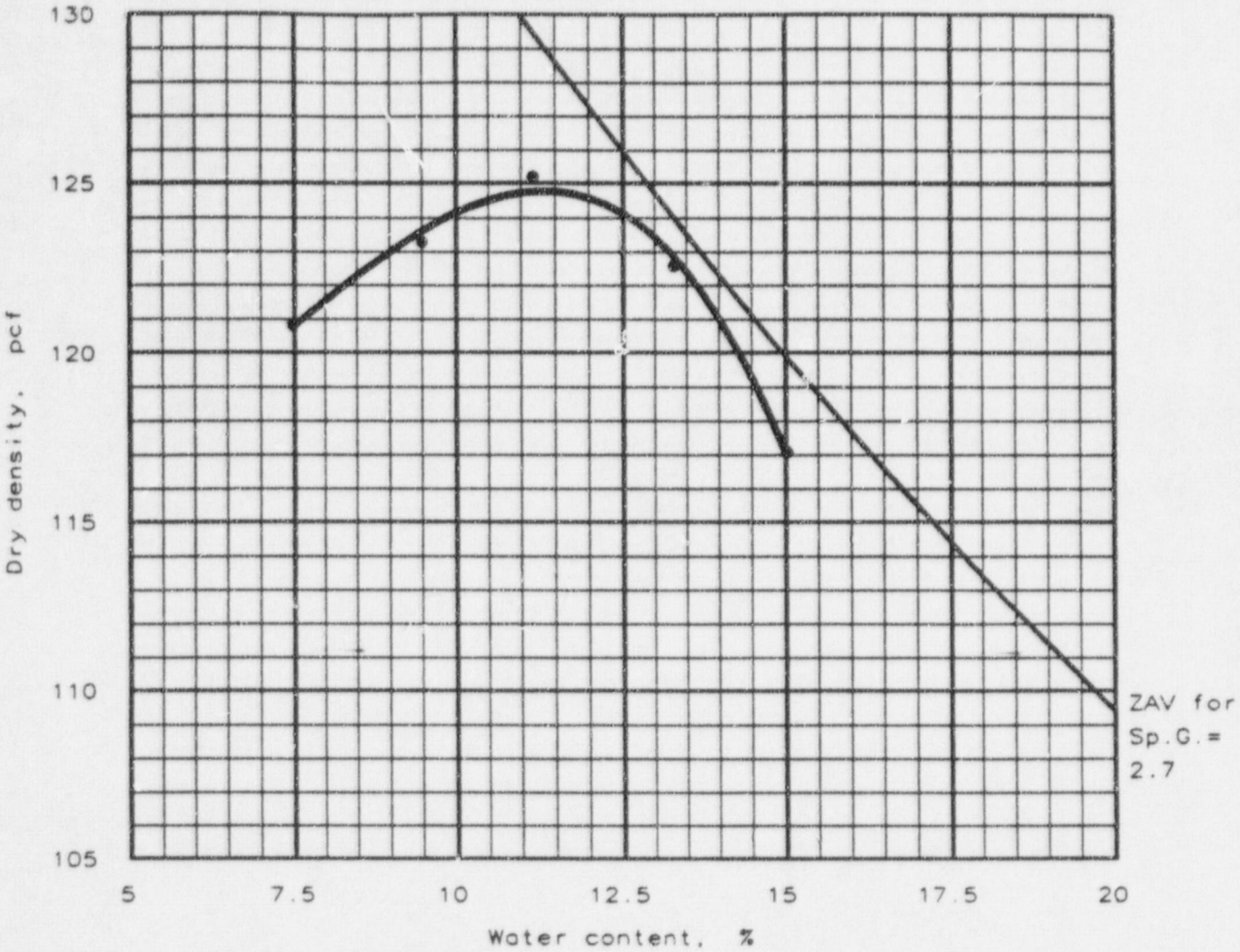
Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. KP403

PROCTOR TEST REPORT



Test specification: ASTM D 1557-91 Method A, Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CL	A-6			31	14	1.9 %	80.2 %

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.8 pcf Optimum moisture = 11.3 %	brown lean CLAY with sand

Project No.: 114409 BP Chemicals, Inc

Project: Cell-2, Mixed Waste Closure Project

Location: Grid H-11- MNW, Ele. 851-849

Date: 07-28-98

Remarks:

Date Received: 07-21-98

PROCTOR TEST REPORT

BOWSER-MORNER, INC.

TEST NO. KP404

REMOLDED PERMEABILITIES

BOWSER MORNER

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 12, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell-2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid H-11- MNW, Ele. 851 - 849
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	124.8
Optimum Moisture Content, %:	11.3

SPECIMEN DATA:

Dimension, Inches:	
Height:	3.018
Diameter:	2.795
Weight, lbs.:	1.344
Moisture Content, %:	
Initial:	12.7
Final:	19.1
Wet Unit Weight, pcf:	
Initial:	125.4
Final:	132.6
Dry Unit Weight, pcf:	111.3
% Compaction:	89.2
Permeability, cm/sec.:	
k:	**2.5×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 12, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell-2, Mixed Waste Closure Project
Location:	Grid H-10+ TNW, Ele. 854 - 852
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	124.9
Optimum Moisture Content, %:	10.8

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.944
Diameter:	2.796
Weight, lbs.:	1.339
Moisture Content, %:	
Initial:	12.0
Final:	18.4
Wet Unit Weight, pcf:	
Initial:	128.0
Final:	135.3
Dry Unit Weight, pcf:	114.3
% Compaction:	91.5
Permeability, cm/sec.:	
k:	**3.4×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid B-10+ TNW, Ele. 859 -857
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	125.2
Optimum Moisture Content, %:	11.0

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.810
Diameter:	2.796
Weight, lbs.:	1.291
Moisture Content, %:	
Initial:	12.7
Final:	19.1
Wet Unit Weight, pcf:	
Initial:	129.3
Final:	136.6
Dry Unit Weight, pcf:	114.8
% Compaction:	91.7
Permeability, cm/sec.:	
k:	**3.2×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid B-11- MNW, Ele. 851 -849
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	123.9
Optimum Moisture Content, %:	12.0

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.976
Diameter:	2.793
Weight, lbs.:	1.331
Moisture Content, %:	
Initial:	13.6
Final:	20.1
Wet Unit Weight, pcf:	
Initial:	126.1
Final:	133.3
Dry Unit Weight, pcf:	111.0
% Compaction:	89.6
Permeability, cm/sec.:	
k:	**9.6×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid C-10+ TNW, Ele. 858 - 856
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	122.6
Optimum Moisture Content, %:	12.8

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.883
Diameter:	2.794
Weight, lbs.:	1.291
Moisture Content, %:	
Initial:	14.5
Final:	20.7
Wet Unit Weight, pcf:	
Initial:	126.2
Final:	133.1
Dry Unit Weight, pcf:	110.3
% Compaction:	90.0
Permeability, cm/sec.:	
k:	**8.9×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 12, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid C-11- MNW, Ele. 851 - 849
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	117.8
Optimum Moisture Content, %:	13.3

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.978
Diameter:	2.800
Weight, lbs.:	1.283
Moisture Content, %:	
Initial:	14.7
Final:	24.5
Wet Unit Weight, pcf:	
Initial:	120.9
Final:	131.2
Dry Unit Weight, pcf:	105.4
% Compaction:	89.5
Permeability, cm/sec.:	
k:	**2.5×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid D-10+ TNW, Ele. 858 - 856
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	123.4
Optimum Moisture Content, %:	11.5

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.998
Diameter:	2.795
Weight, lbs.:	1.327
Moisture Content, %:	
Initial:	13.1
Final:	19.3
Wet Unit Weight, pcf:	
Initial:	124.7
Final:	131.6
Dry Unit Weight, pcf:	110.3
% Compaction:	89.4
Permeability, cm/sec.:	
k:	**1.8×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid D-11- MNW, Ele. 852 - 850
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	123.2
Optimum Moisture Content, %:	12.0

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.966
Diameter:	2.794
Weight, lbs.:	1.336
Moisture Content, %:	
Initial:	13.1
Final:	20.7
Wet Unit Weight, pcf:	
Initial:	126.9
Final:	135.4
Dry Unit Weight, pcf:	112.2
% Compaction:	91.1
Permeability, cm/sec.:	
k:	4.7×10^{-8}

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 12, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid G-10+ TNW, Ele. 855- 853
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	124.8
Optimum Moisture Content, %:	10.9

SPECIMEN DATA:

Dimension, Inches:	
Height:	2.981
Diameter:	2.798
Weight, lbs.:	1.339
Moisture Content, %:	
Initial:	12.4
Final:	18.9
Wet Unit Weight, pcf:	
Initial:	126.2
Final:	133.5
Dry Unit Weight, pcf:	112.3
% Compaction:	90.0
Permeability, cm/sec.:	
k:	**2.6×10^{-8}**

FALLING HEAD PERMEABILITY TEST
ASTM D5084
LABORATORY COMPACTED

Date:	August 11, 1998
Project No.:	114409
Client:	BP Chemicals, Inc.
Project:	Cell - 2, Mixed Waste Closure Project
Date Received:	07-21-98
Location:	Grid G-11- MNW, Ele. 851 - 849
Material Description:	"CL" brown lean CLAY with sand
ASTM D1557, Modified Proctor	
Maximum Dry Density, pcf:	123.4
Optimum Moisture Content, %:	11.7

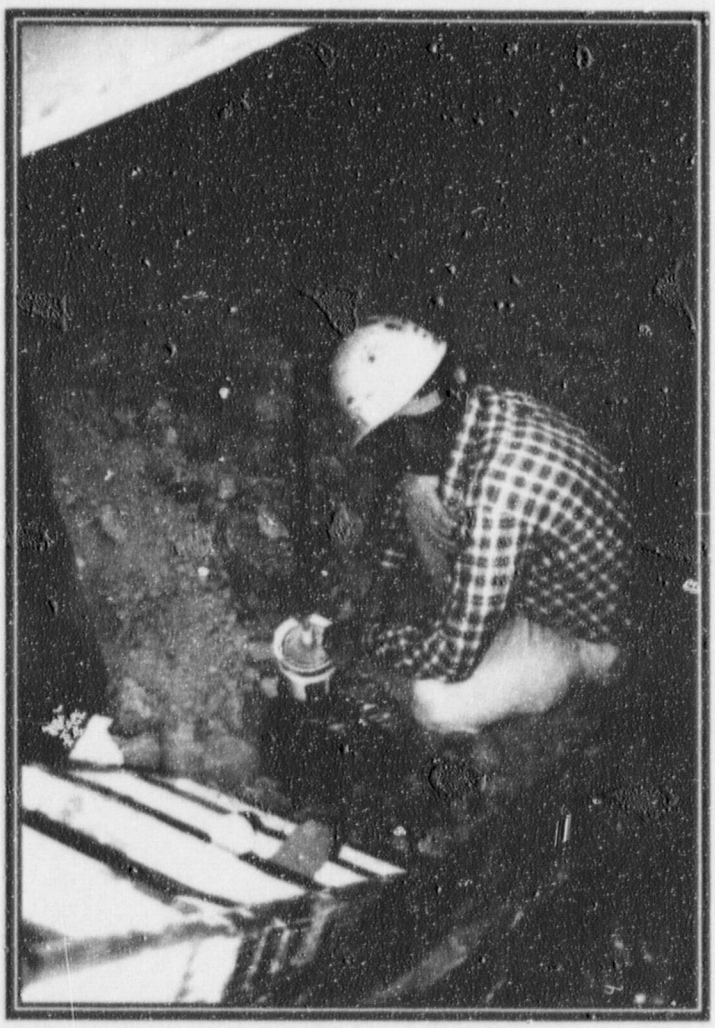
SPECIMEN DATA:

Dimension, Inches:	
Height:	3.023
Diameter:	2.790
Weight, lbs.:	1.338
Moisture Content, %:	
Initial:	13.3
Final:	20.1
Wet Unit Weight, pcf:	
Initial:	125.1
Final:	132.6
Dry Unit Weight, pcf:	110.4
% Compaction:	89.5
Permeability, cm/sec.:	
k:	**3.6×10^{-8}**

APPENDIX C

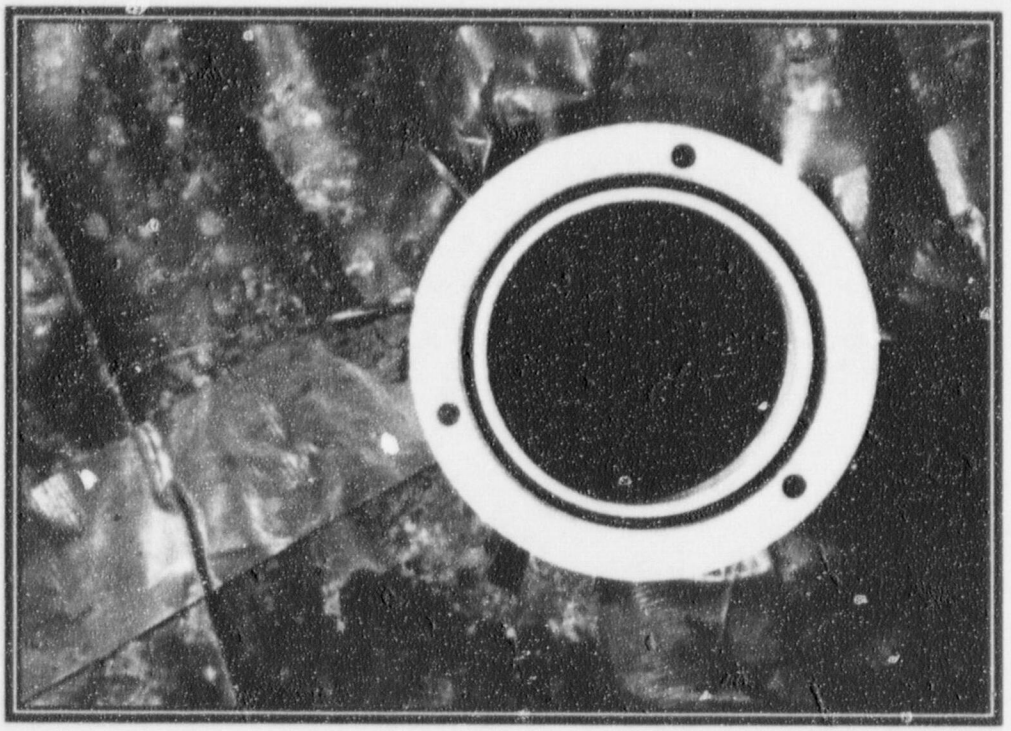
CONSTRUCTION PHOTOGRAPHS

BOWSER MORNER

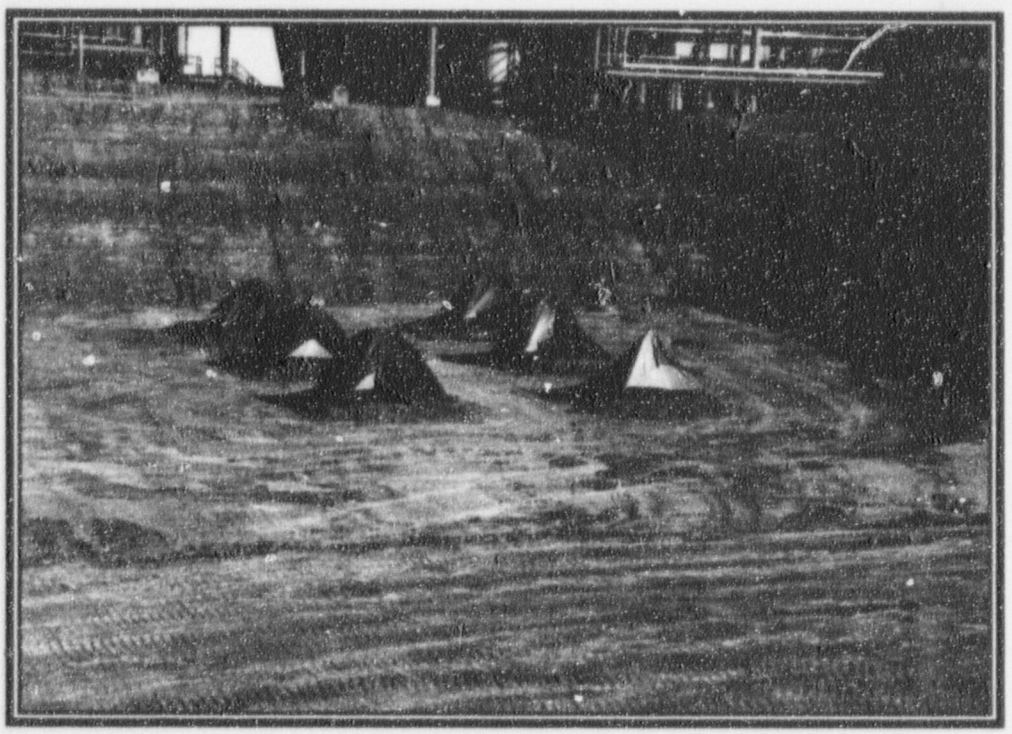


Photograph 1: *Crew working to install permeameter.*

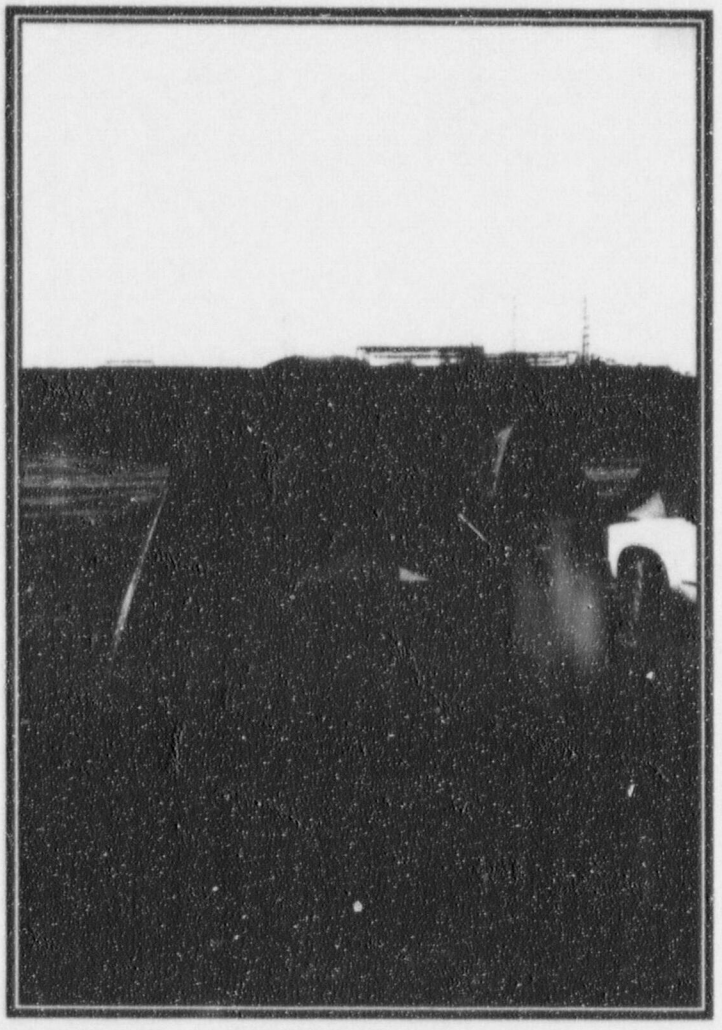
Photograph 2: *Permeameter installation in the pit.*



Photograph 3: *Top view through a 4-inch PVC permeameter*



Photograph 4: *Tents to protect the permeameter from weather.*



Photograph 5: *View of the tent.*